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HANDBOOK OF METHODS FOR INFORMATION SYSTEMS ANALYSTS AND DESIGNERS

Volume II - Appendix II TRACE

Synectics Corporation

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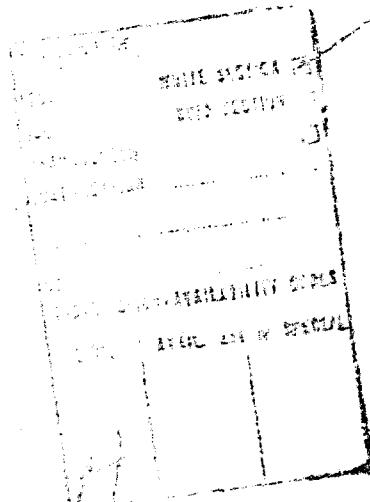
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Air Force Systems Command
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13. ABSTRACT A generalizable procedure for the analysis and design of information systems is described in the context of allied and supporting data methods, design assessment, and project management considerations. This procedure follows from a view of information systems development as a complex series of goal-directed iterations, rather than a well-ordered sequence of simple steps. In each iteration, tentative design alternatives are progressively narrowed, better defined, carefully assessed, and revised until a workable, user-responsive solution is operationally activated. The analysis and design procedure is developed in two forms: (1) a comprehensive discussion of the basic concepts, rationale, and constructive operations supported by detailed flow diagrams; and (2) a simplified, convenient working tool (TRACE), illustrated with two sample system design problems of widely different complexity. Handbook content and organization were evolved, uniquely, through provisions for systematic evaluation-refinement cycles at selected stages during the period of materials development. Potentially relevant materials were evaluated by a cross section of RADC research and development personnel with extensive practical experience in all facets of information systems development, who used techniques specifically adapted for this purpose. The resultant handbook constitutes a single-source, practice-oriented guide intended for those with formal training in the information sciences, but with little or no experience in military information systems development.		

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HANDBOOK OF METHODS FOR INFORMATION SYSTEMS ANALYSTS AND DESIGNERS

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APPENDIX II

T R A C E

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TOTAL REQUIREMENTS ANALYSIS
FOR CONCEPT AND ELEMENTS

APPENDIX II

TRACE

Introduction

This Appendix provides a working technique for information systems analysis and design: Total Requirements Analysis for Concept and Elements--TRACE. The technique emphasizes system requirements--very dynamic in nature and usually difficult to define--as the most important aspect of information system design and implementation. The large foldout included with this Appendix II summarizes in illustrative form the entire technique and its main features. It can be seen that one of the primary prerequisites for TRACE to be used effectively is that system management be a central activity in the entire flow of the system analysis effort in order to make important, periodic decisions. Another important aspect of TRACE in guiding a system analysis effort is that the system products be clearly defined as either (1) hardware elements, (2) personnel elements, (3) software elements, (4) facility elements, or (5) support elements.

This Appendix illustrates the application of the tasks and related steps identified in TRACE for analyzing two sample systems. The eight major tasks within TRACE are listed in Figure A2-1, and the essential steps within each major task are listed in Figures A2-2 through A2-9. The order of steps presented may be varied somewhat in actual practice or performed in parallel; however, the tasks are established in a firm sequence with some acceptable latitude for overlapping the beginning of one task before completing the preceding one.

Differences of opinion may arise with respect to specific system elements being categorized in one system element category versus another. For instance, application software documentation or software maintenance training can be categorized as software elements or support elements. Categorizing elements depends on the type of system, its stage of implementation, its direction--whether it is an upgrade effort to an existing system or a

BASIC TASKS WITHIN TRACE:

- o DATA COLLECTION
- o DATA ANALYSIS
- o SYSTEM CONCEPT DESIGN
- o SYSTEM SPECIFICATION DESIGN
- o BASELINE IMPLEMENTATION
- o BASELINE SYSTEM EXERCISES
- o FINAL IMPLEMENTATION
- o OPERATIONAL ACCEPTANCE

Note: Reference large flow chart summarizing TRACE while reading this appendix.

Figure A2-1

ESSENTIAL STEPS IN DATA COLLECTION

- 1) DEFINE SYSTEM FUNCTION
- 2) DETERMINE INTERFACES
- 3) DETERMINE SECURITY CRITERIA
- 4) DETERMINE DATA TYPES
- 5) DETERMINE DATA VOLUME
- 6) DETERMINE ORGANIZATIONAL LINKS
- 7) REVIEW TECHNOLOGY
- 8) PRODUCT REQUIREMENTS DETAILED

Note: Reference large flow chart summarizing TRACE while reading this appendix.

Figure A2-2

A2-4

ESSENTIAL STEPS IN DATA ANALYSIS

- 1) DETAILED DATA FLOW
- 2) ANALYZE HARDWARE TRADEOFFS
- 3) VALIDATE SOFTWARE AVAILABILITY
- 4) PRODUCTS IN PRIORITY
- 5) OPERATIONAL FACTORS IN PRIORITY
- 6) ANALYZE FACILITY NEEDS
- 7) REVIEW PERSONNEL IMPACT
- 8) IDENTIFY SUPPORT CONSIDERATIONS

Note: Reference large flow chart summarizing TRACE while reading this appendix.

Figure A2-3

ESSENTIAL STEPS IN SYSTEM CONCEPT DESIGN

- 1) ESTABLISH OPERATING CONCEPT
- 2) DATA PROCESSING NEEDS
- 3) DATA FLOW ALTERNATIVES
- 4) MAN-MACHINE INTERACTION
- 5) DATA BASE DESIGN
- 6) DEFINE APPLICATION SOFTWARE
- 7) FUNCTIONAL SYSTEM HARDWARE NEEDS
- 8) SCENARIO DEVELOPMENT

Note: Reference large flow chart summarizing TRACE while reading this appendix.

Figure A2-4

A2-6

ESSENTIAL STEPS IN SYSTEM SPECIFICATION DESIGN

- 1) HARDWARE ELEMENT CHARACTERISTICS
- 2) SYSTEM SOFTWARE SPECIFICATIONS
- 3) APPLICATION PROGRAM SPECIFICATIONS
- 4) DATA BASE GENERATION PLAN
- 5) FILE MANAGEMENT SYSTEM SPECIFICATION
- 6) FUNCTIONAL EQUIPMENT CRITERIA
- 7) FACILITY PLAN
- 8) DETAILED MAN-MACHINE OPERATIONS
- 9) DATA INTERFACE GUIDE

Note: Reference large flow chart summarizing TRACE while reading this appendix.

Figure A2-5

A2-7

ESSENTIAL STEPS IN BASELINE IMPLEMENTATION

- 1) INITIAL HARDWARE INSTALLATION
- 2) DATA BASE CREATION
- 3) SYSTEM SOFTWARE MODIFICATIONS
- 4) APPLICATION PROGRAMMING
- 5) TEST PROCEDURES
- 6) TRAINING PLAN
- 7) REQUIREMENTS SCENARIO FINALIZED
- 8) SYSTEM SUPPORT STARTED

Note: Reference large flow chart summarizing TRACE while reading this appendix.

Figure A2-6

ESSENTIAL STEPS IN BASELINE SYSTEM EXERCISES

- 1) SCENARIO EXERCISING
- 2) DATA BASE UPDATING
- 3) PRODUCT TRIALS
- 4) TEST DATA ANALYSIS
- 5) TEST DOCUMENTATION
- 6) DATA FLOW CHECK
- 7) REQUIREMENTS PRIORITY REVIEW

Note: Reference large flow chart summarizing TRACE while reading this appendix.

Figure A2-7

ESSENTIAL STEPS IN FINAL IMPLEMENTATION

- 1) ALL KEY HARDWARE INSTALLED
- 2) APPLICATION PROGRAMS CHECKOUT
- 3) DATA BASE COMPLETION
- 4) USER DOCUMENTATION
- 5) SYSTEM EXPANSION ACTIONS
- 6) FACILITIES COMPLETED
- 7) PERSONNEL TRAINED
- 8) SYSTEM SUPPORT ON-SITE

Note: Reference large flow chart summarizing TRACE while reading this appendix.

Figure A2-8

ESSENTIAL STEPS IN OPERATIONAL ACCEPTANCE

- 1) COMPLETE PRODUCT GENERATION
- 2) DATA FLOW PROCEDURES SET
- 3) SYSTEM OPERATING PROCEDURES
- 4) SYSTEM OPERATING DOCUMENTATION COMPLETE
- 5) TRAINING DOCUMENTATION COMPLETE
- 6) ACCEPTANCE TEST DEMONSTRATIONS
- 7) INTERFACE PROCEDURES
- 8) EXPANSION OR MODIFICATIONS
- 9) DATA SECURITY VERIFICATION

Note: Reference large flow chart summarizing TRACE while reading this appendix.

Figure A2-9

new effort, and the background of the people involved in the system analysis project. As the reader reviews the two sample systems and studies the system analysis flow charts of TRACE, it will be apparent that arbitrary decisions were made about these elements. If differences of opinion remain about the elements as categorized here, the sequence of steps or their impact on the system results should not be affected. It is necessary, at a minimum, to (1) identify and examine the system element categories, and (2) firmly decide in what manner each identified system element will be categorized.

TRACE Utilization

The application of the Total Requirements Analysis for Concept and Elements (TRACE) technique of system analysis and implementation is largely dependent upon whether the resultant "system" is relatively simple or complex. Normally, smaller systems can be designed and implemented in a short time period as compared to complex systems which require more development and/or organizational interface activity. In information systems, it is often convenient to categorize a planned system into either a "Short Time to Operational Implementation" (0-3 years) or a "Long Time to Operational Implementation" (3-10 years) frame of reference. This decision can frequently be made during the project establishment or planning phase and certainly by the end of the Data Collection or Data Analysis Tasks within the TRACE sequence of events. Figure A2-10 illustrates the main criteria that are characteristic of these two categories of systems. It is seldom that every criteria will be firmly established at the outset of a system design effort; however, as the initial two tasks are completed (Data Collection and Data Analysis), it must be known whether the program will culminate in an operational capability within either a 3 or 10 year time frame. In fact, user groups need this information in formulating plans for future system operations.

The design team plays a large part in developing a clear understanding of all the criteria shown in Figure A2-10, and can usually assure whether (1) requirements are well defined, (2) close cooperation and interface between

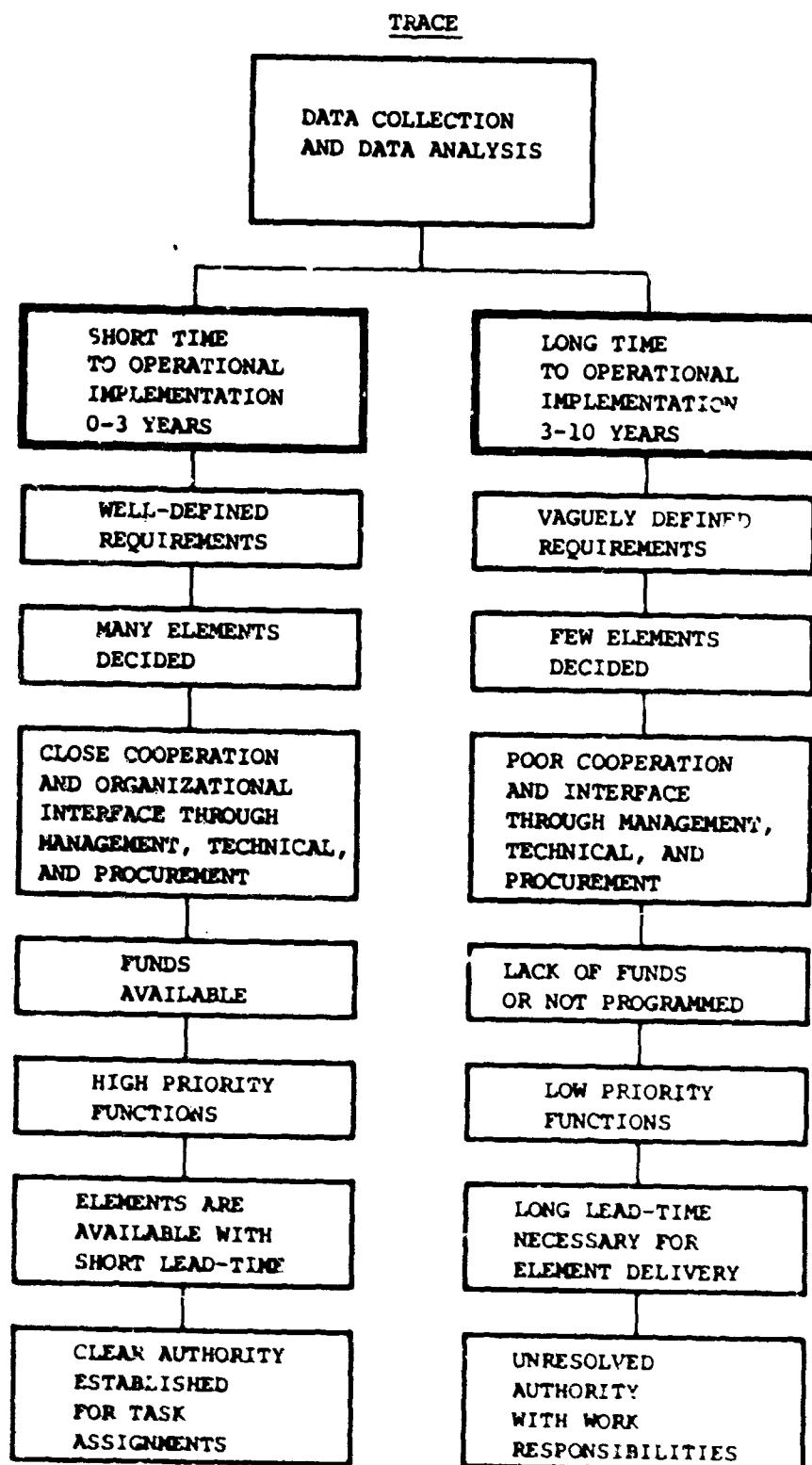


Figure A2-10 Management Categories of System Analysis Projects

technical factors are possible, and (3) there is or can be a clear line of authority to accomplish the system design and implementation. The first two tasks within TRACE bring these features of the system into clear focus. Additional features which assist in determining whether a system is categorized as a short- or long-term project are greatly affected by various management levels, the operational situation at the time, and the state of technology. Some of these features are also affected or changed by the design team; however, they should be examined and their character determined as soon as possible.

Assuming that it is possible to place a system in one of these two basic categories from a management standpoint, TRACE can be applied appropriately to assist the system analysis effort. The following pages illustrate in diagram and text form the application of the TRACE technique of system analysis to a short- and long-term system. These two examples describe how the key elements of hardware, personnel, software, support, and facilities can be identified, acquired, installed, and integrated into operation for a range of information systems. TRACE is a guide which assists the system analyst in checking whether the design work is complete as well as in anticipating design steps required of the analyst or a technical design staff working under his direction.

The discussions concerning TRACE are organized according to its relationship to the system elements as indicated in Figure A2-11. Again, the two categories or complexities of systems are discussed to pinpoint where and when the tasks and steps contained in TRACE should be modified or adjusted in sequence as a result of the characteristics of the system problem. These two sample system problems are titled (1) Environmental Infrared Surveillance Reporting System (Short-Term) and (2) Tactical, Integrated Mission Analysis Support System (Long-Term). These titles and their respective descriptions are purely fictitious and are utilized only for illustrative purposes. To approximate operational systems, the system analysis data presented relative to each system are based on actual similar systems; however, the specific characteristics or criteria of the sample systems are synthesized for the purposes of discussing TRACE with specific examples and not

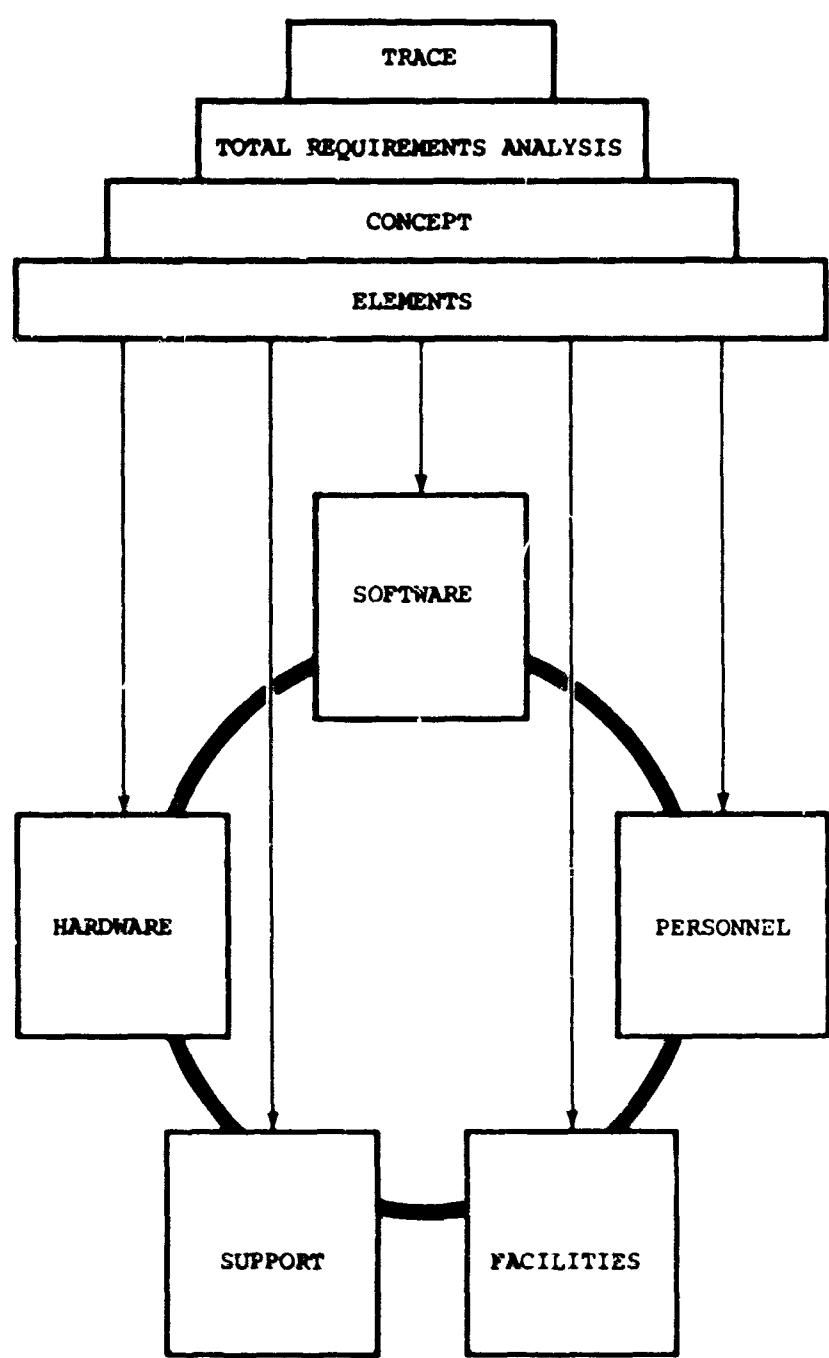


Figure A2- 11. Guide to Descriptive Information for TRACE

specifically based on real operational systems. The bounds of each sample system are widely different as shown in Figure A2-12.

Sample System #1 Characteristics

The following conditions exist for the Sample System #1 analysis effort which is aimed at developing and implementing an Environmental Infrared Surveillance Reporting System.

1. The product requirements are well defined and are very straightforward. They consist of a one-page standard pre-formatted alpha-numeric report to be displayed on a CRT console, edited, approved, and stored on a magnetic tape. Only a high-speed printout is required periodically of the magnetic tape records which contain the data as approved at the console and directed for storage. The data are stored and printed serially in the same chronological order as approved.
2. Many elements of the proposed system are defined, including the computer and all peripherals except the CRT console. The facility is defined except for shielding and air conditioning/heating for the consoles and the other computer equipments. The system must be completed for user acceptance at his location in two years. Manpower is available for training at contractor facilities at any time during the two years. Operating and maintenance support items can be made available if identified and ordered within six months of on-site need. No special functional hardware item is needed in addition to the aforementioned computer system with the one CRT console.
3. Close cooperation has existed between individuals at all levels in the development group and the operational user

ENVIRONMENTAL INFRARED
SURVEILLANCE REPORTING SYSTEM
(Short-Term)

- o Display
- o Edit
- o Approve
- o Store
- o Retrieve Printout

SAMPLE SYSTEM #1 FUNCTIONAL BOUNDS

TACTICAL, INTEGRATED MISSION ANALYSIS
SUPPORT SYSTEM
(Long-Term)

- o Intelligence Data Collection
- o Data Reduction & Data Extraction
- o Information Processing
- o Intelligence Data Handling
- o Mission Analysis
- o Command and Control Support
- o Data Dissemination & Coordination

SAMPLE SYSTEM #2 FUNCTIONAL BOUNDS

Figure A2-12. Relative Difference in Magnitude of Functional Characteristics Between the Sample Systems Presented In Appendix #2.

group for many years. The development group is actually co-located in a building adjacent to the user personnel.

4. Funds have been budgeted, approved, and allocated for procuring the system elements as soon as an approved exhibit is prepared for each item to be purchased, and a plan is developed to guide government preparatory activities in training, facility modification, etc.
5. The system is being installed to accomplish priority functions much faster and more accurately than previously possible. All justification-type staff work has been completed and the decision made to proceed with system design activities, leading to as quick an implementation as possible.
6. All elements are available within the two-years time schedule even if identified and approved only one year ahead of the planned acceptance date.
7. Clear authority has been established for this effort. Procurement, technical responsibility, and management support are all identified by name for both the design-developer group and the user group.

In this particular system, neither the collection of infrared photography nor the extraction of information from the photography is a problem for this system effort since it will be completed by the time this system is used. Only the rapid editing of general data content and positional accuracy within the pre-formatted display are of major concern to the operator in this instance. The primary goal here is to correct some of the previous errors in report composition and speed up the filing of intelligence data onto magnetic tape records for later storage and use. There is no concern for future utilization of the intelligence data after they are filed. It is assumed that the future use of the data is already determined, and that no further interface is needed between this reporting system and the other systems through which the digital data are eventually used or disseminated.

Sample System #2 Characteristics

A completely different situation exists in Sample System #2. The long-term complex, Tactical, Integrated Mission Analysis Support System is comprised of many subsystems or major components which need careful definition and integration at various levels. This type of system might include a many faceted intelligence data collection portion, a data reduction portion, a data extraction portion, an intelligence data handling portion, a mission analysis portion, a command and control support portion, and a communication portion included in its entirety. Depending upon whether the mission analysis is concerned with aircraft, naval ships, or tanks, the overall effort at hand is greatly affected. In any case, the magnitude of technical considerations within this system is much greater than the previous example and certainly requires some variation in the use of the TRACE method. It is important to note, however, that TRACE can still be used as a basic guide and is probably even more advantageous when system problems are complex and very interrelated. TRACE becomes especially useful as more specific details are addressed. It should be noted that increased cooperation and interface is required as the system analysis effort progresses. A deterioration must not occur in this area if success is to be achieved. In addition, TRACE is advantageously employed where the design staff is experienced in the various technical aspects of the envisioned systems. The technique can be used throughout the system analysis effort and at a level of detail required to coordinate the staff's activities, and further, can be used to clarify the design tasks involved in a complex program. The basic characteristics given at the outset for this type of system analysis effort are as follows:

1. The requirements are very numerous and need much further definition because of the magnitude of the functions to be included in this system. The system to be analyzed is basically an Air Force land-based installation in support of offensive aircraft flight operations only over enemy tactical targets that can be moved. As stated above,

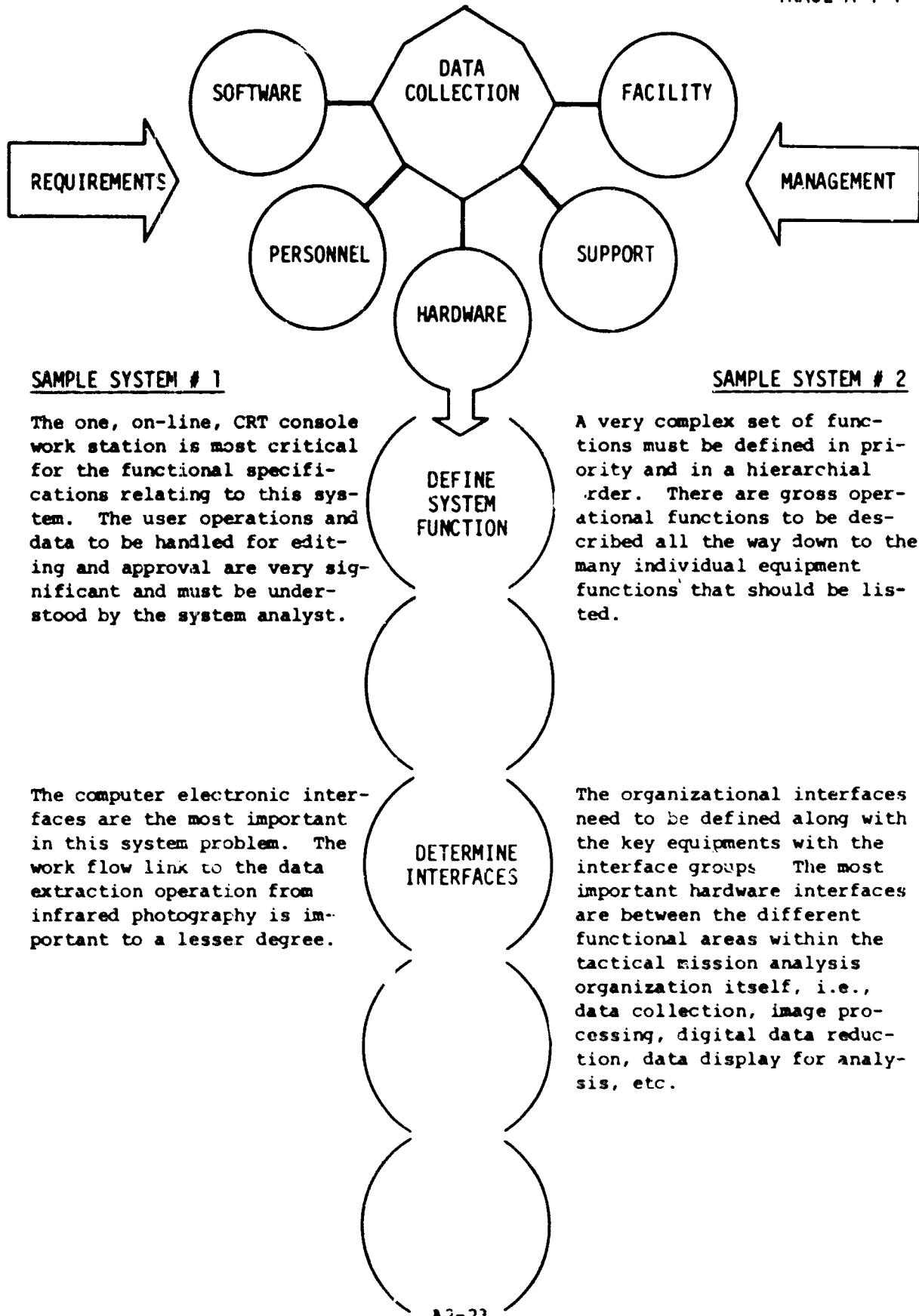
this system (by definition from management directives) must include the subsystems for collection of information, data reduction and extraction of data for intelligence, processing of data to perform mission analysis, handling of intelligence to generate various products within the system, and presentation of data to facilitate flight operations command and control functions; and providing capabilities for communicating or disseminating the resultant information for inter-organizational coordination. For the purposes of this example, all interfaces remain within the Numbered Air Force spectrum of interest so that the many inter-service links are avoided. By confining the interfaces, potential security areas that could arise in the technical presentation of operational-type information are eliminated.

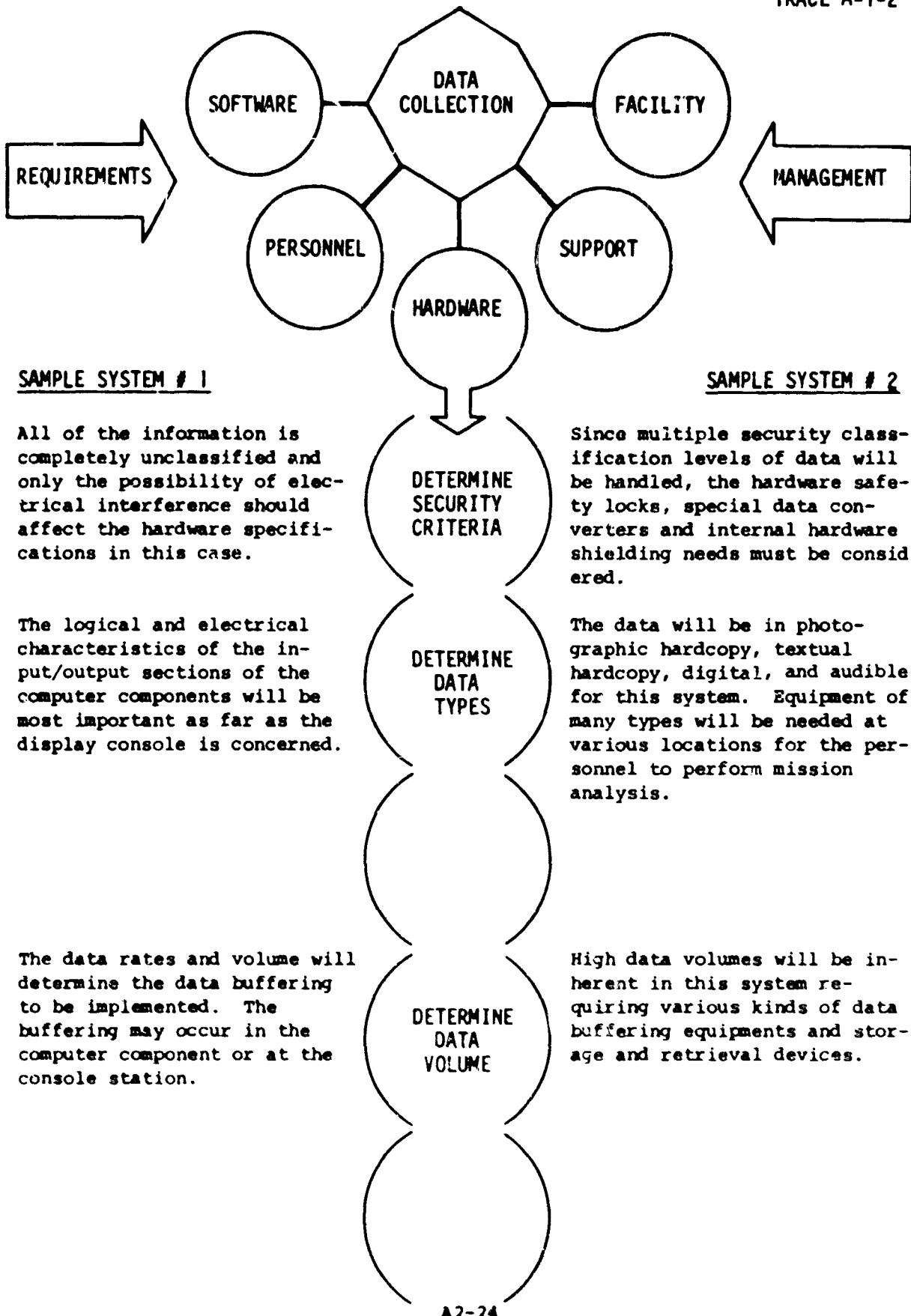
2. Very few elements of hardware, software, personnel, facilities, or support are determined for this system at the beginning. When this situation exists in complex systems, the importance of recycling the requirements continually while proceeding through the steps of TRACE cannot be over emphasized. As information is collected about the detailed needs of such a system, some previous or early requirement assumptions are bound to change. As the complexity of the system and the time involved in performing the entire effort increase, greater change can be anticipated. Changes in basic operational mission requirements over time must also be considered.
3. There is average cooperation and interface at all levels between the various groups concerned with developing and implementing the system. It will be necessary for increased interaction to take place between the different groups participating in this effort as more people become involved.

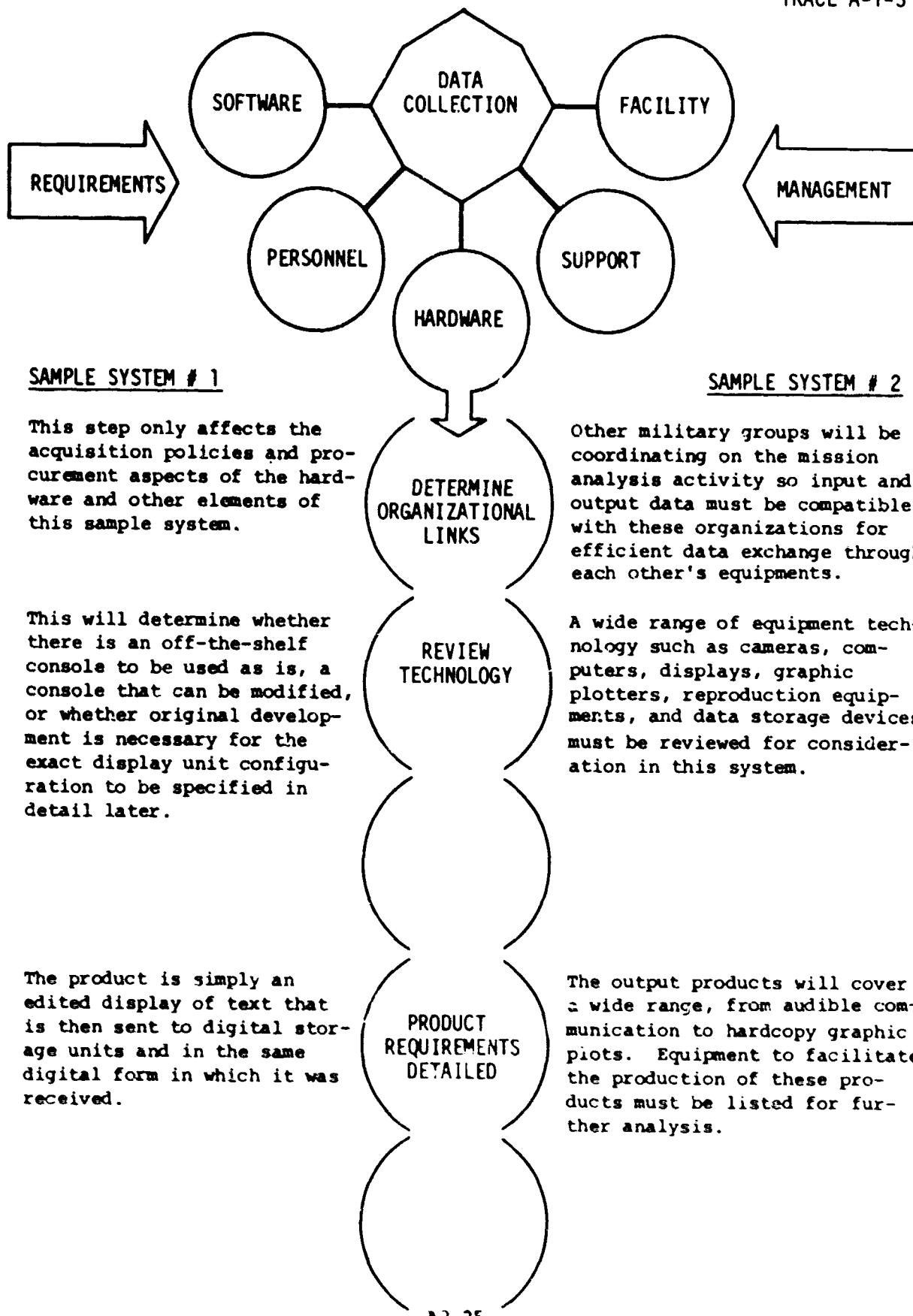
4. Funds have been approved for the first four tasks of system analysis only. During the period of time when these tasks are being conducted, it will be necessary to justify the release of more funds in order to proceed through procurement of the system elements themselves. This is very often the case with many developmental systems and emphasizes the need for complete support documentation at periodic intervals throughout the system analysis effort.
5. The system is being developed to accomplish a high priority mission much faster and more accurately than before possible. This is necessitated by a new generation of tactical aircraft entering the Air Force inventory in the near future.
6. Many hardware and software elements are known to be long lead-time items. Many one-of-a-kind hardware elements will be required even though very few need original research and development. The programming in the data processing area will be significant because of the number of separate functions to be supported for the first time by automated, on-line computer techniques. A five-to-ten year schedule has been estimated and coordinated through Air Force management channels for this program.
7. Clear technical authority, procurement, and user responsibilities have been decided as far as commands are concerned. The names of all individuals and sub-groups below Air Force Command levels have not been resolved at the outset of this project. This fact requires much coordination effort on the part of the design team and emphasizes the critical need for supporting data throughout the system analysis effort in order to accomplish this coordination.

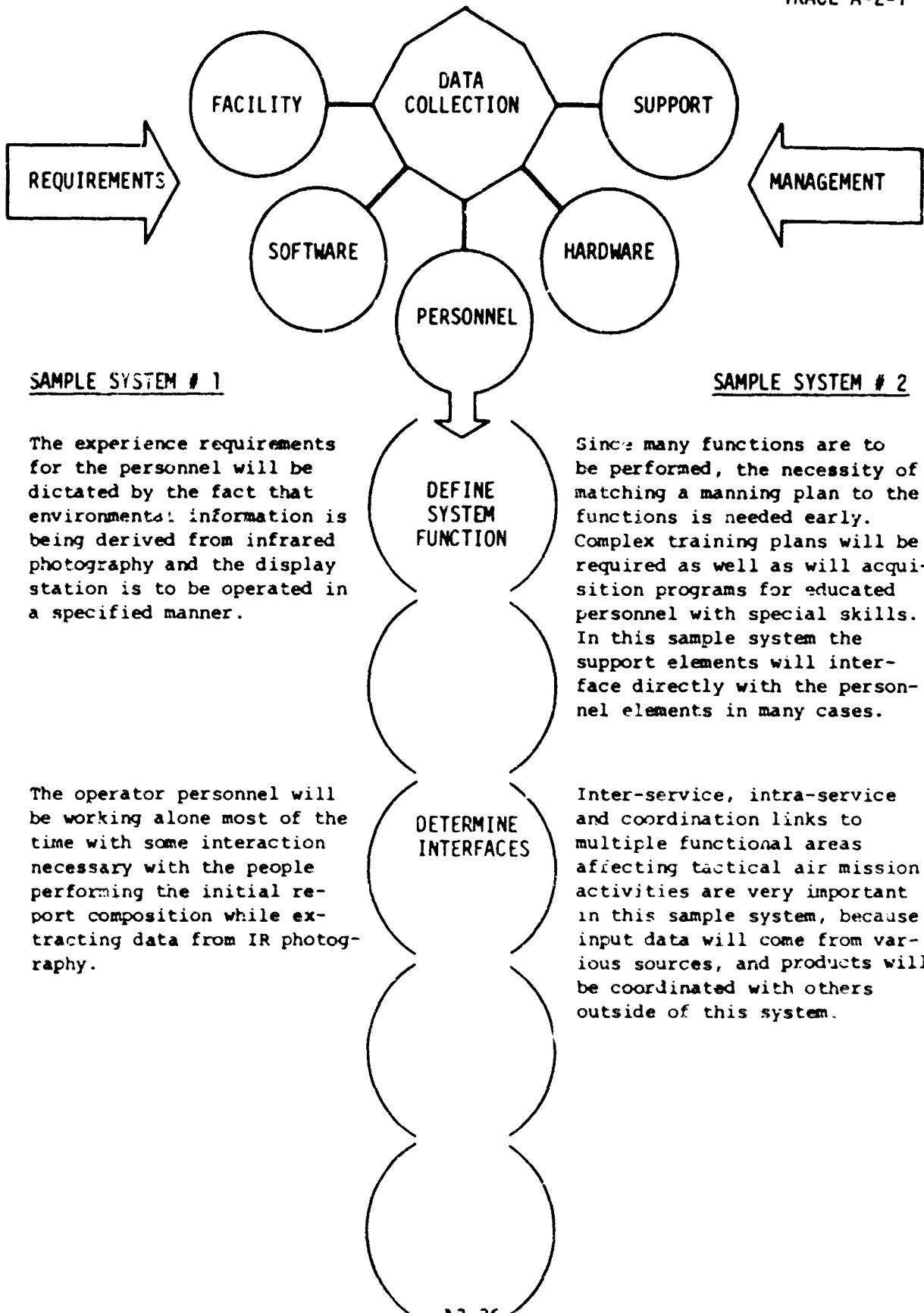
The remainder of this Appendix is a set of flow charts which contain the tasks involved in performing system analyses. Each task (A-H) illustrates how each of the five sets of system elements, namely, hardware,

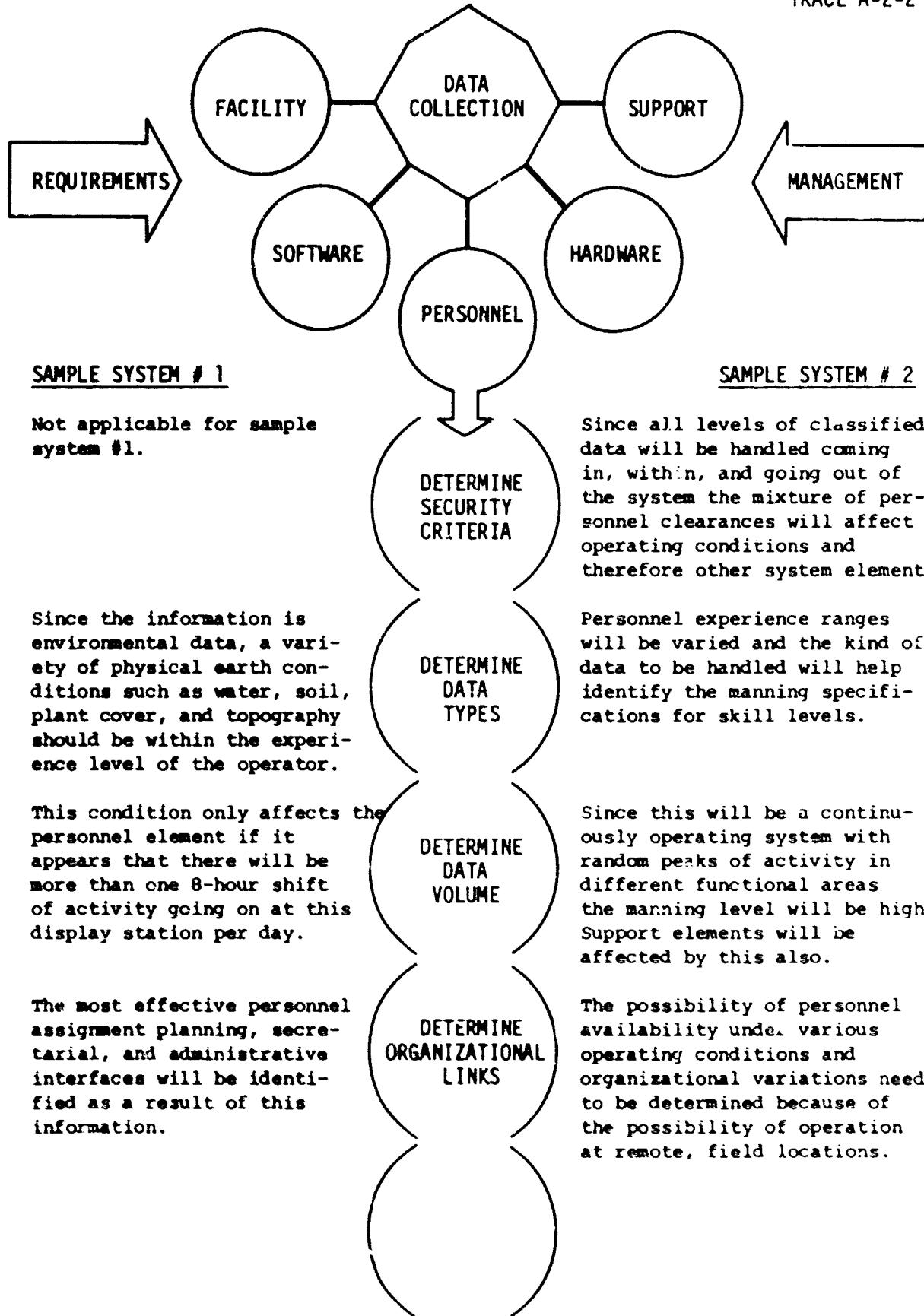
personnel, software, facility, and support (1-5) are affected by the specific steps included within the related tasks. There is a short narrative description for each step relating how the sample systems and their elements are affected by specific design activities. The format of these pages assists the reader in referencing either the task or the category of system element within any specific task. Each page is labeled with a three-field identifier for index purposes. The first task (Data Collection) is task A, and the hardware elements-related pages are indicated as A-1 with the successive pages indicated by the third number. For example, A-1-1, A-1-2, and A-1-3 illustrate the hardware-oriented effects of the system analysis steps in the Data Collection Task, and A-2-1, A-2-2, and A-2-3 illustrate the personnel effects of the system analysis steps in the Data Collection Task, and so on. This pattern of indexing the TRACE detailed illustrations is maintained throughout the remainder of this Appendix. This same format can be used in actual practice by system analysts in the future. By deleting the text on either side of the center "step indicators" the same forms could be easily used for any system as guides and/or to help record key events.

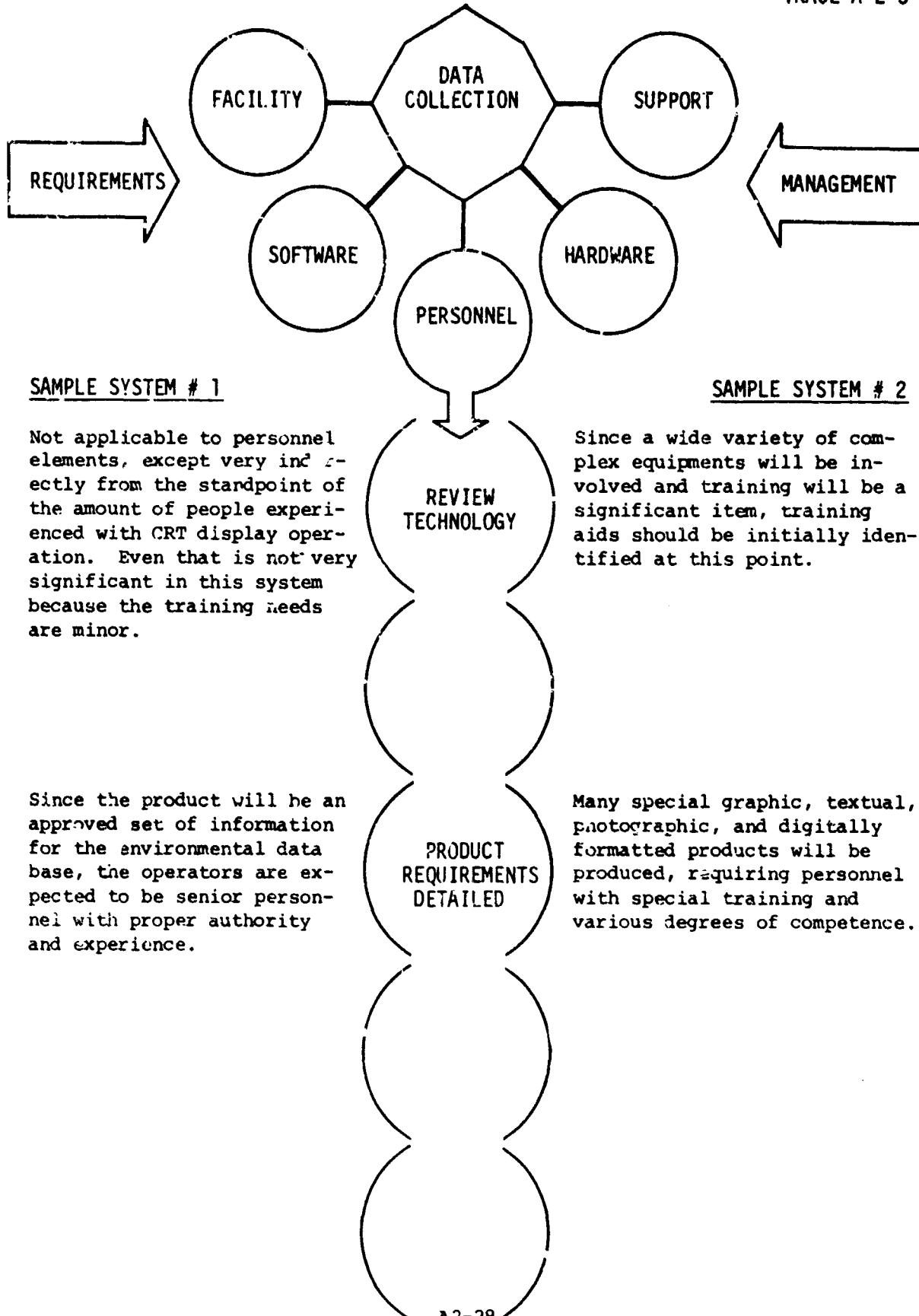


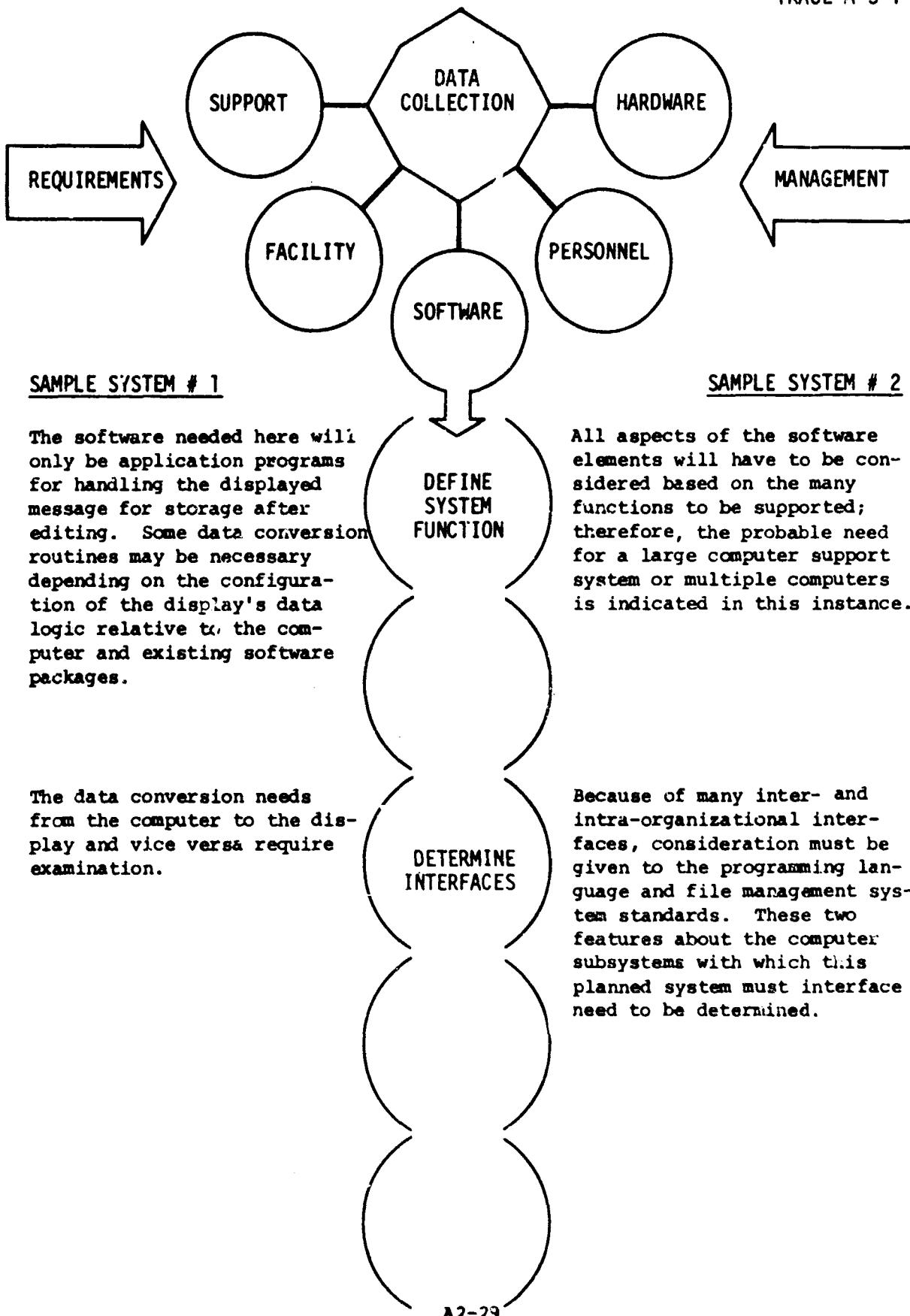


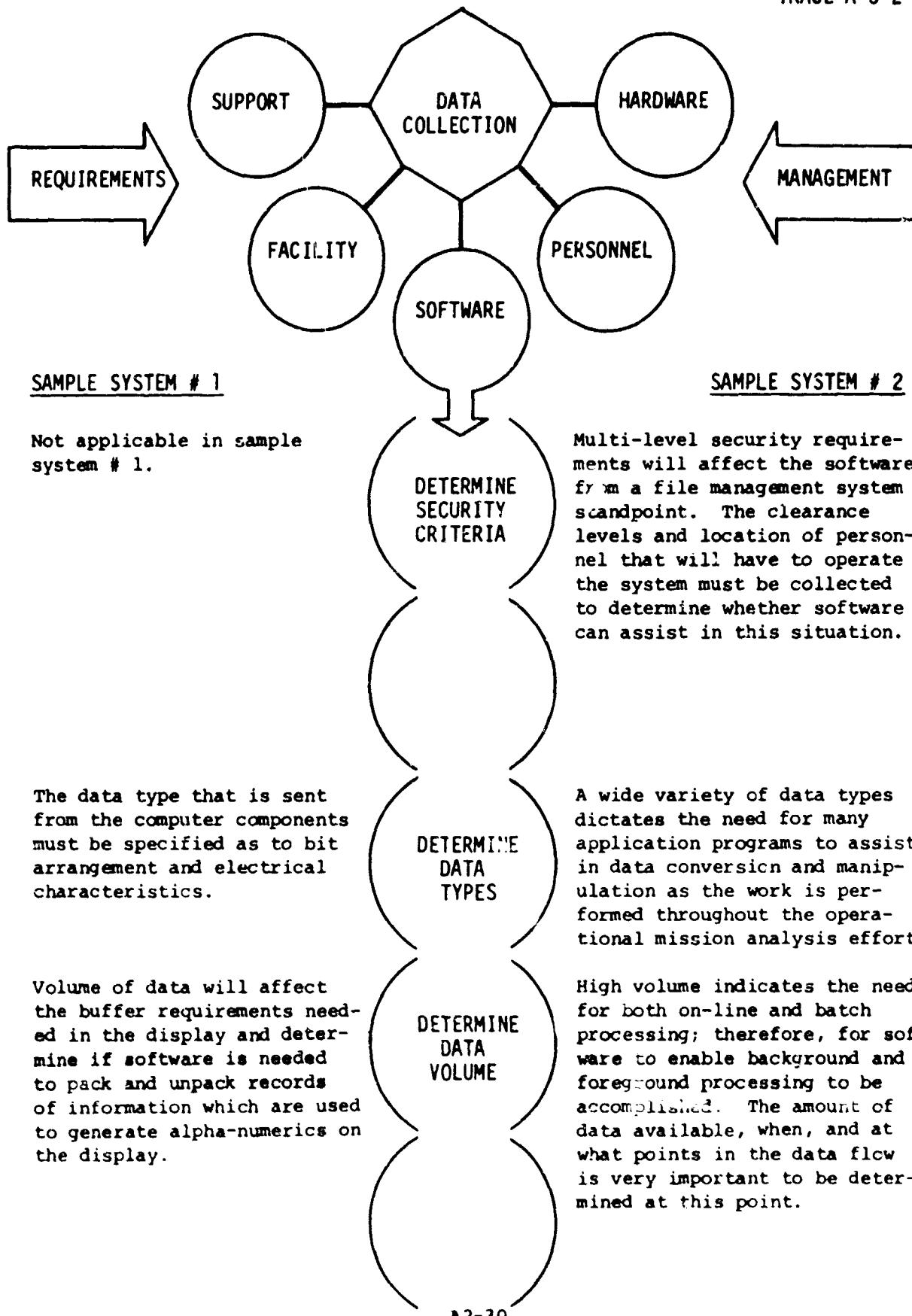


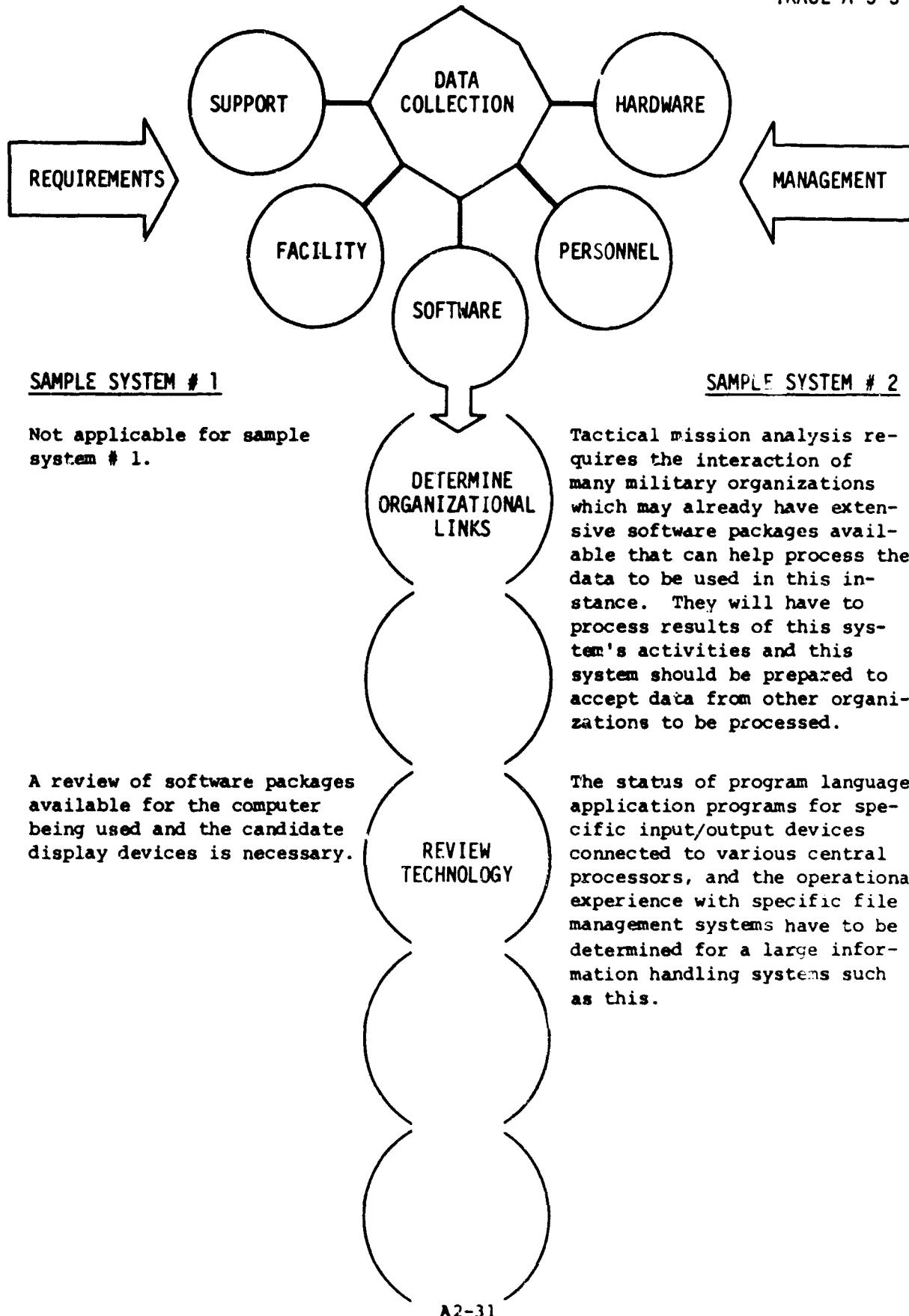


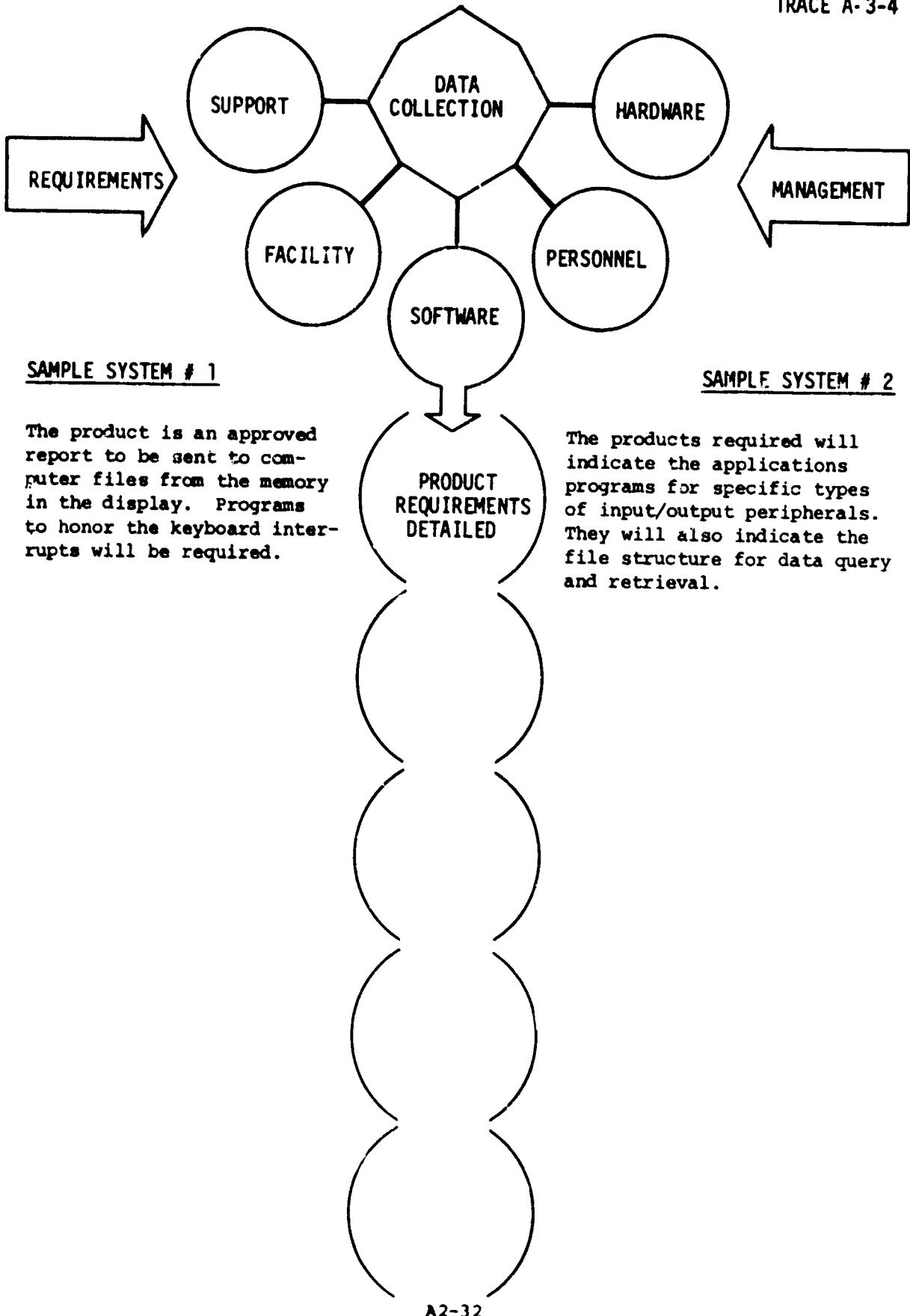


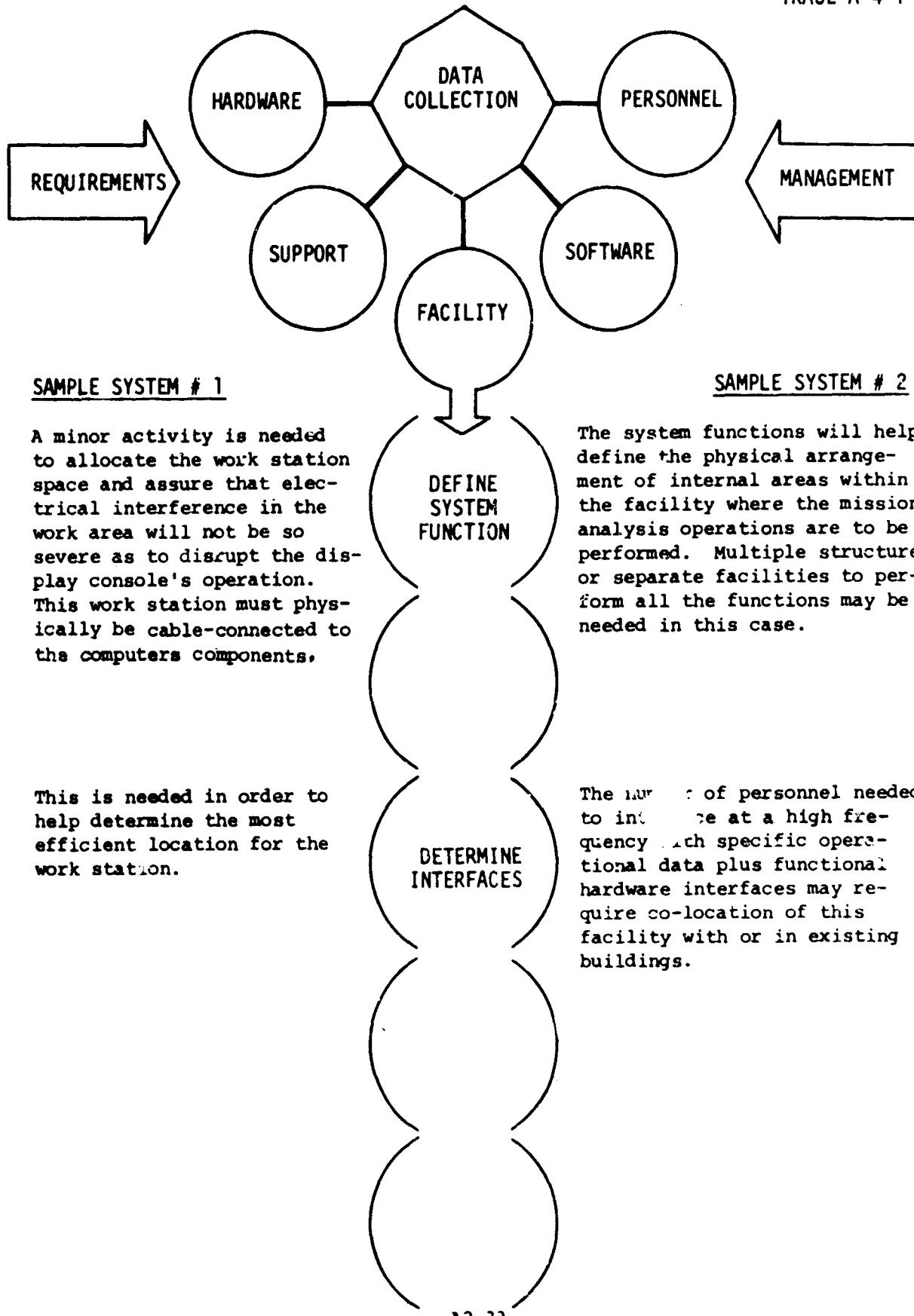


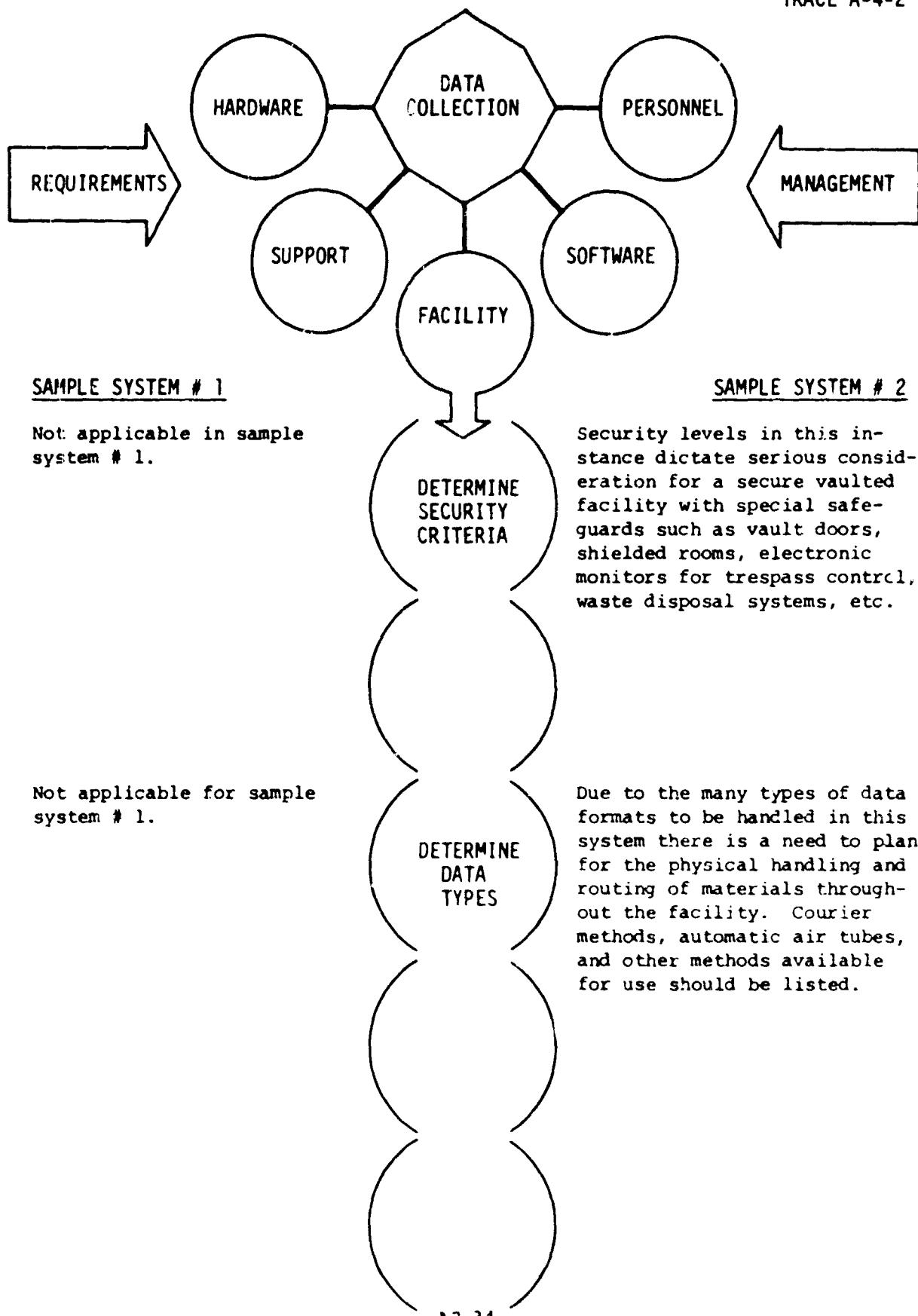


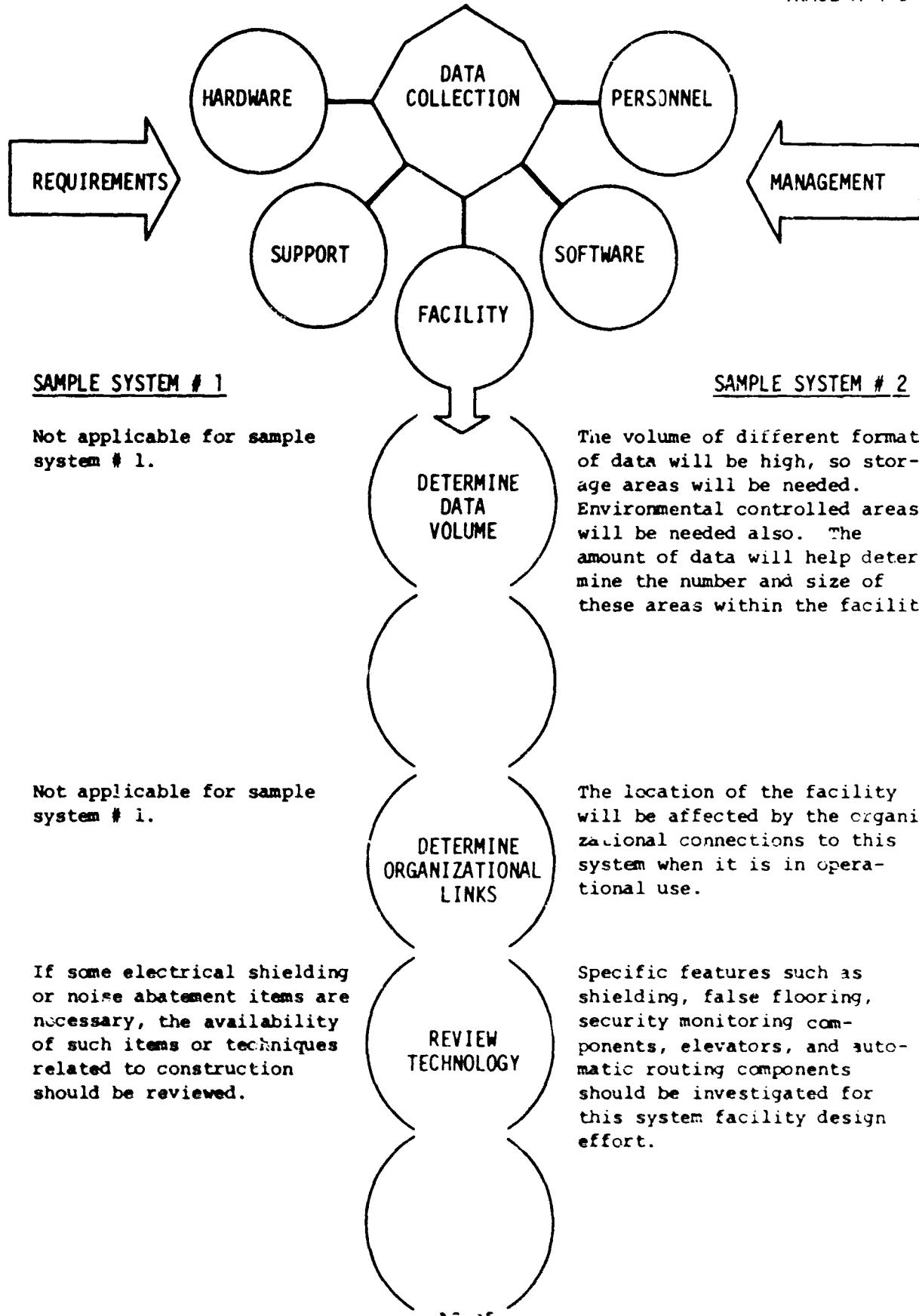




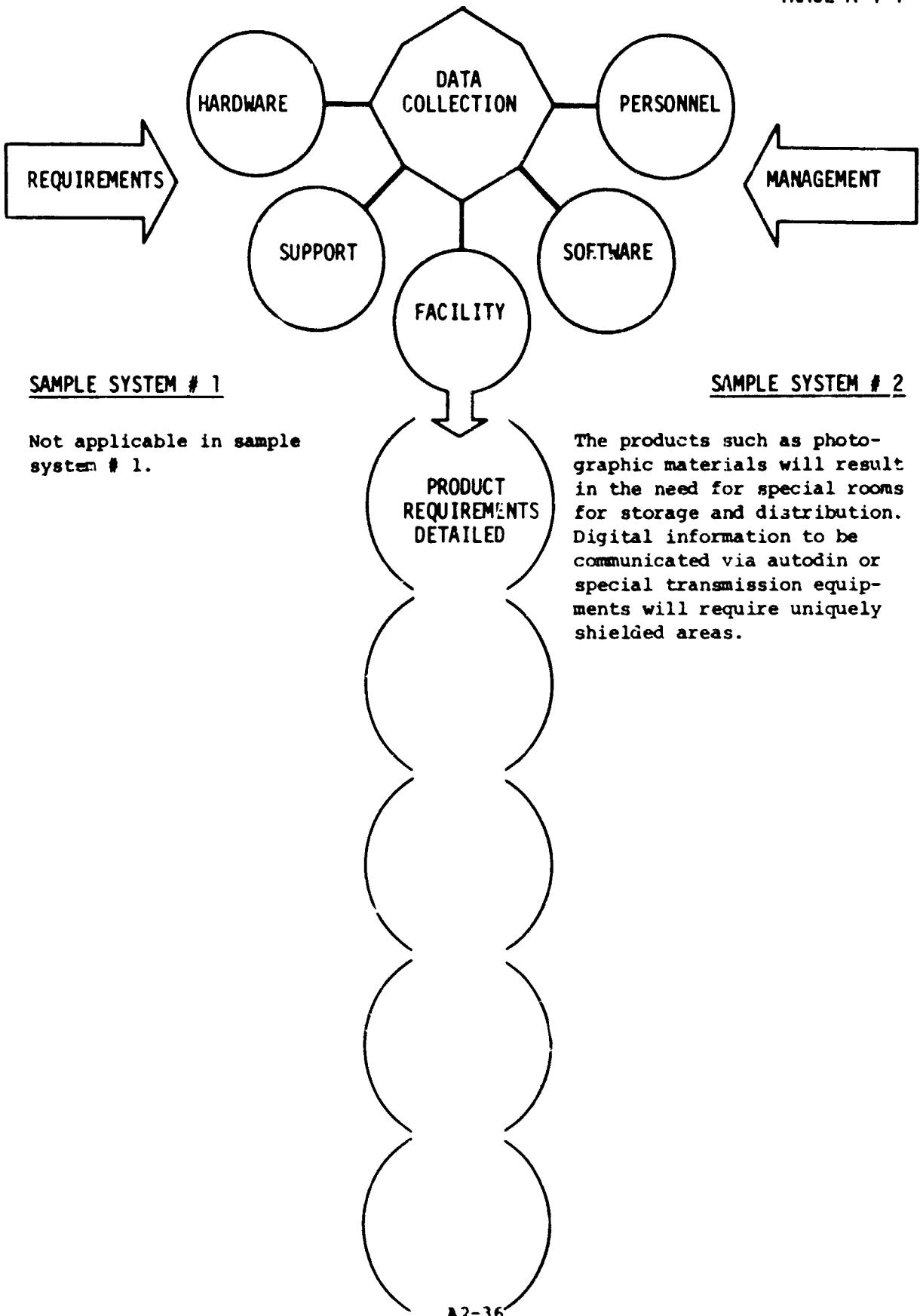


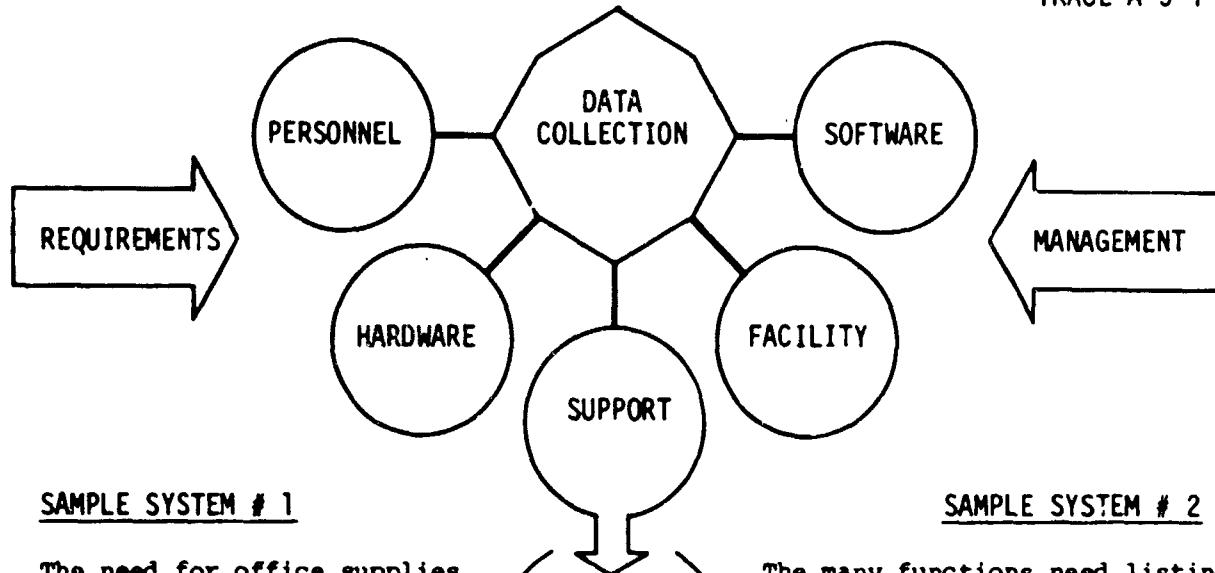






TRACE A-4-4



SAMPLE SYSTEM # 1

The need for office supplies and items to insure the operator's comfort at the console work station will depend on the functions to be performed.

SAMPLE SYSTEM # 2

The many functions need listing to help determine the supply, maintenance, documentation support, personnel housing support, and training support required in developmental and operational stages of this system.

Not applicable for sample system # 1.

DEFINE
SYSTEM
FUNCTION

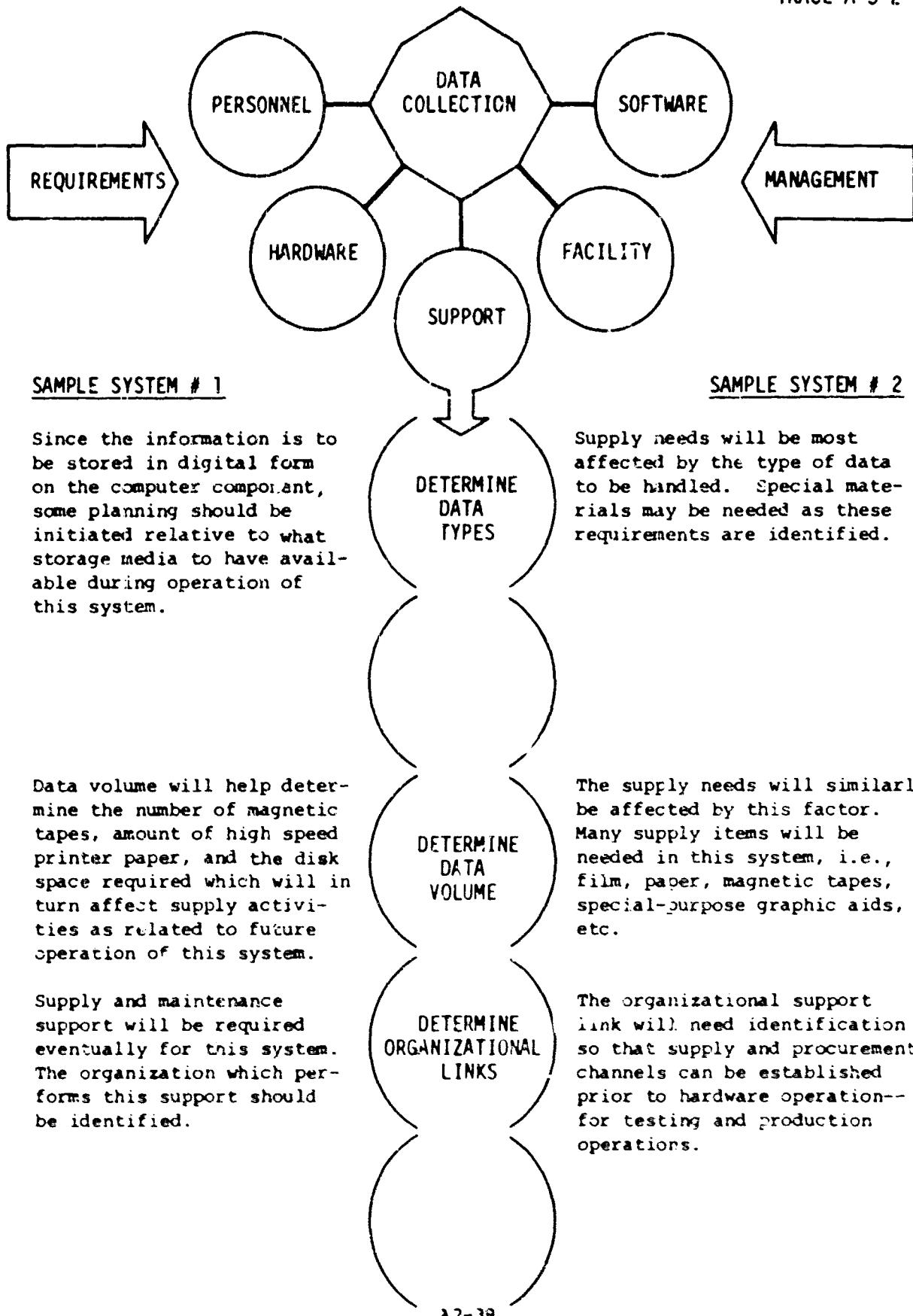
The operational interfaces that require long communication lines or special equipments with highly trained operators will indirectly affect the support needed.

Not applicable for sample system # 1.

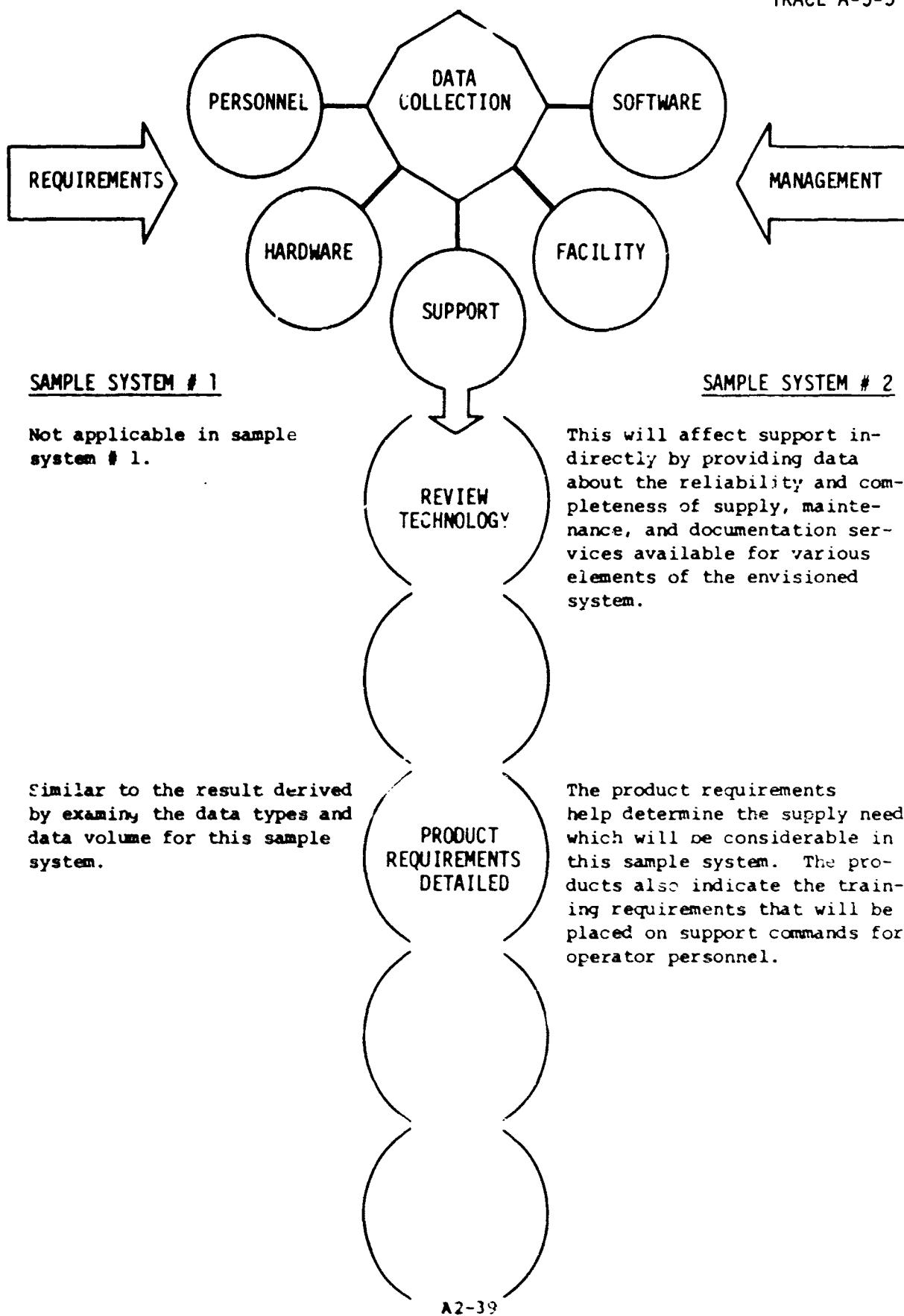
DETERMINE
INTERFACES

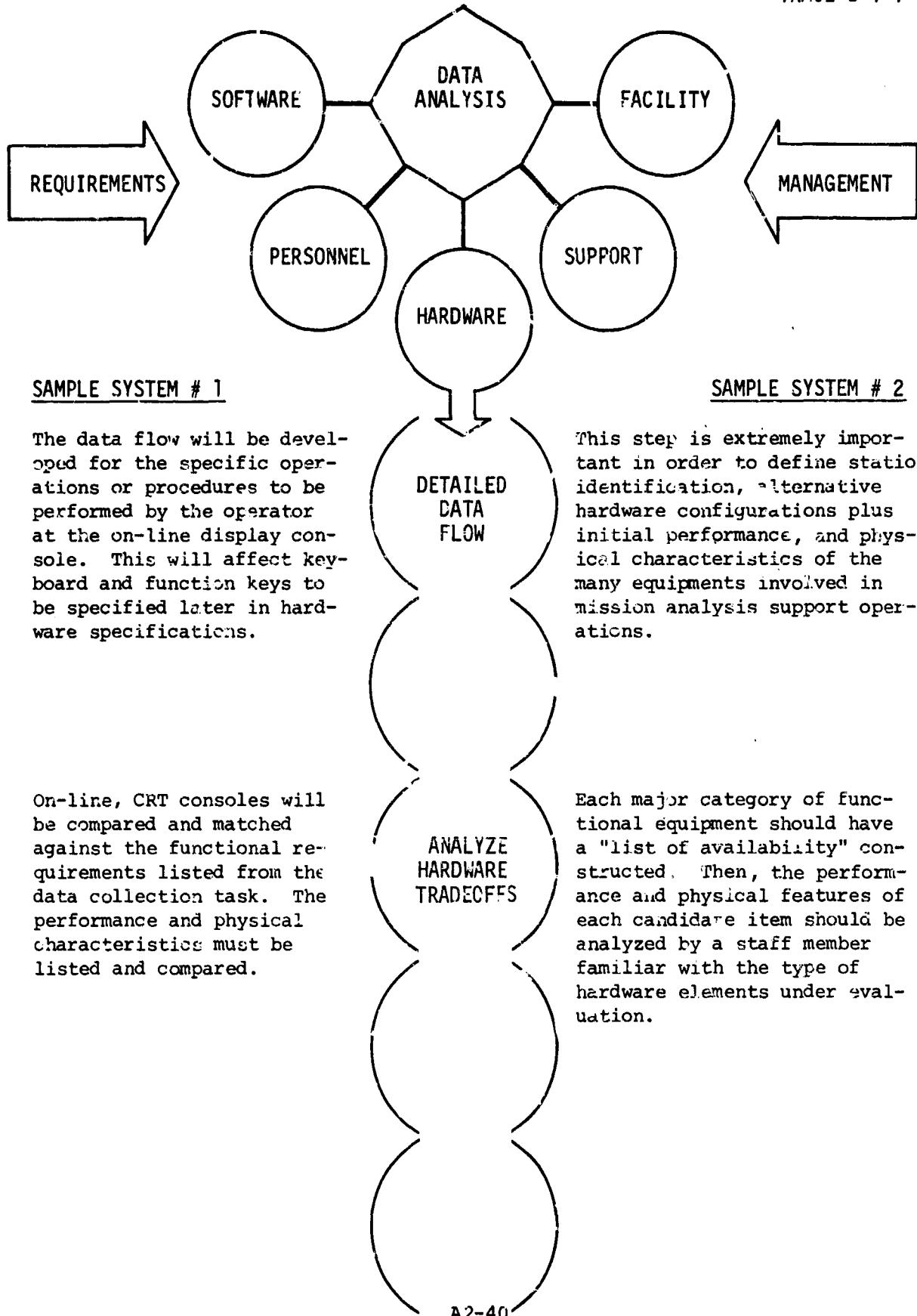
This aspect will affect the support personnel arrangements such as access to equipment for maintenance, the time of day for supplies to be moved, and the clearance problems during training periods.

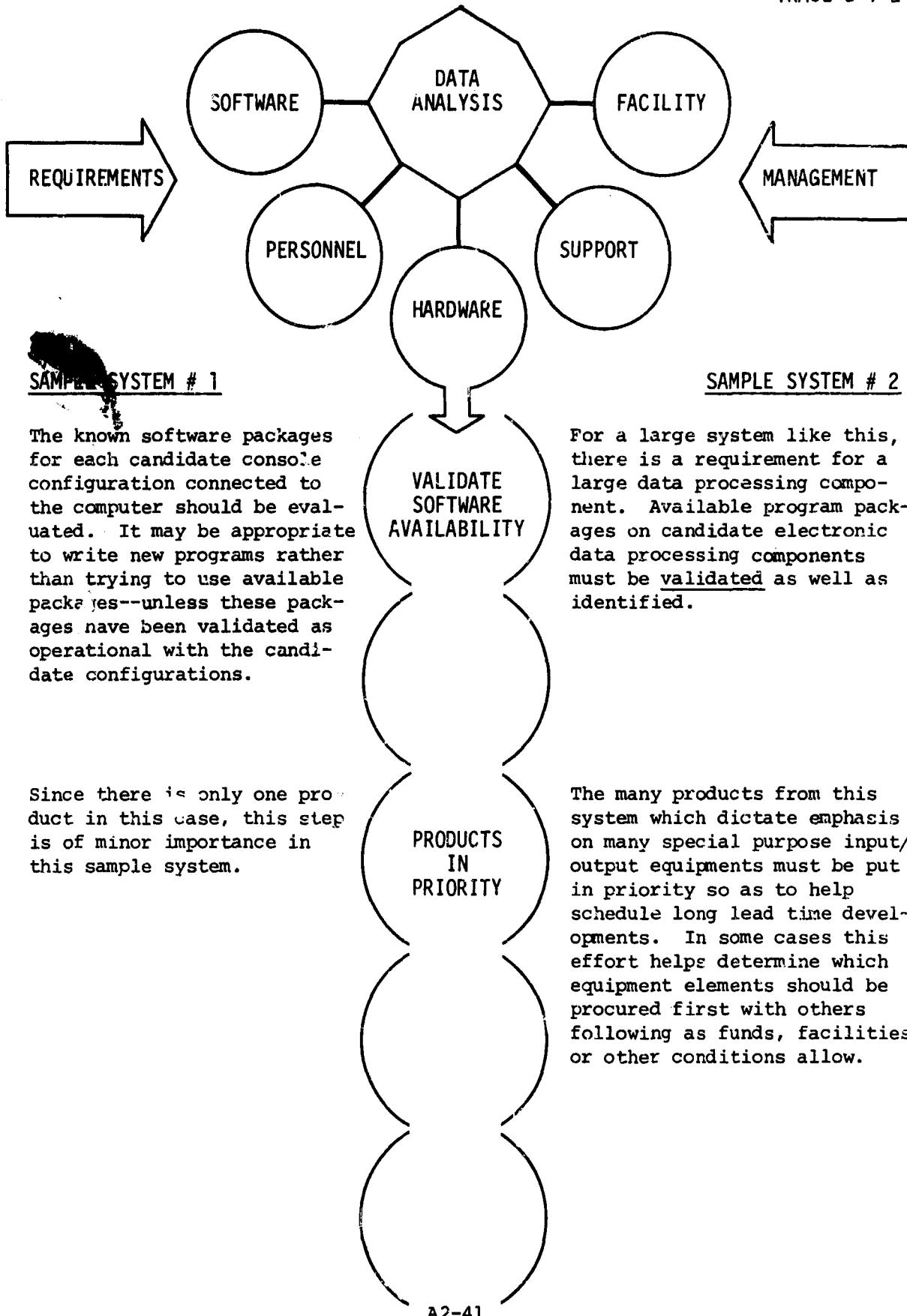
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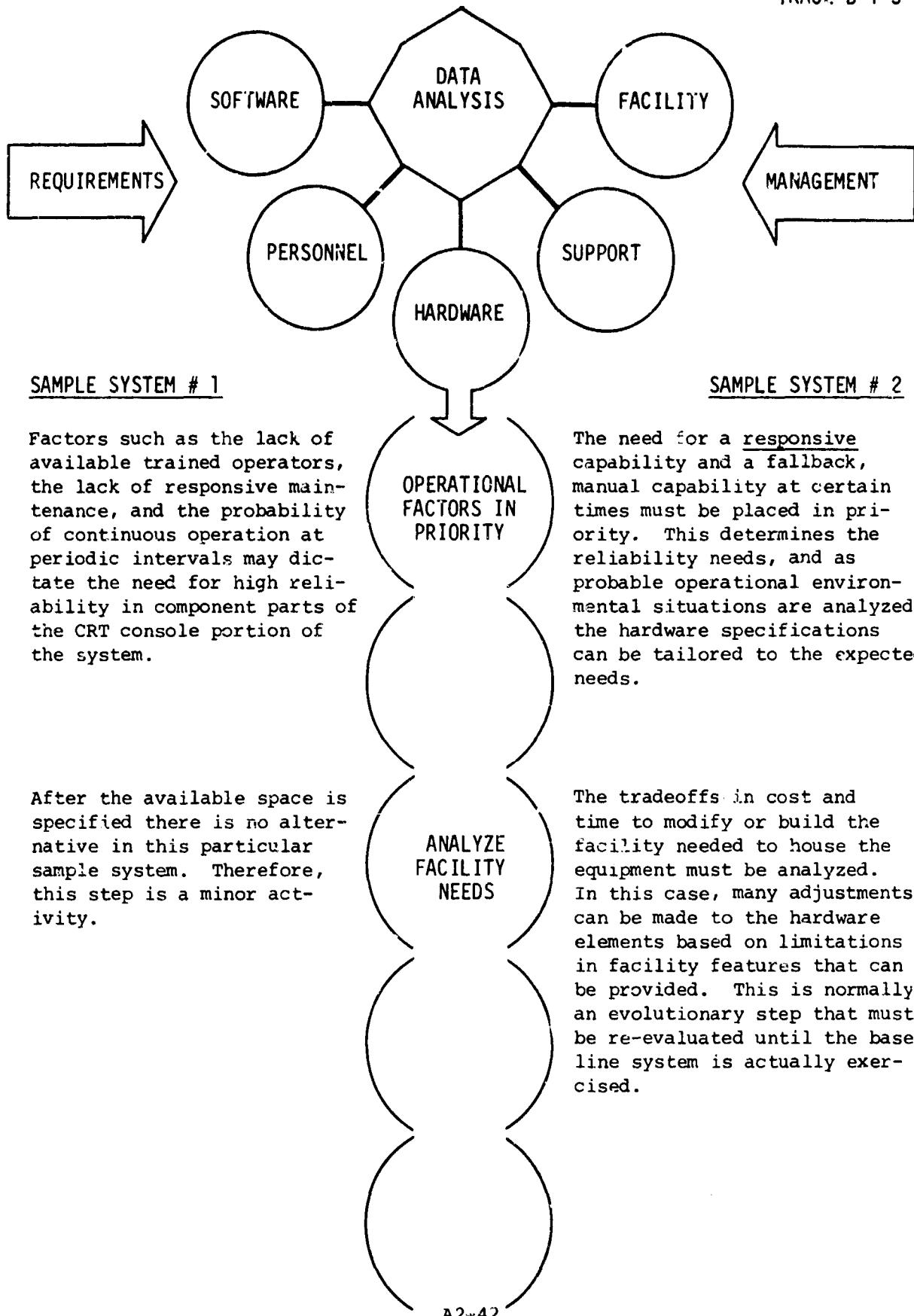


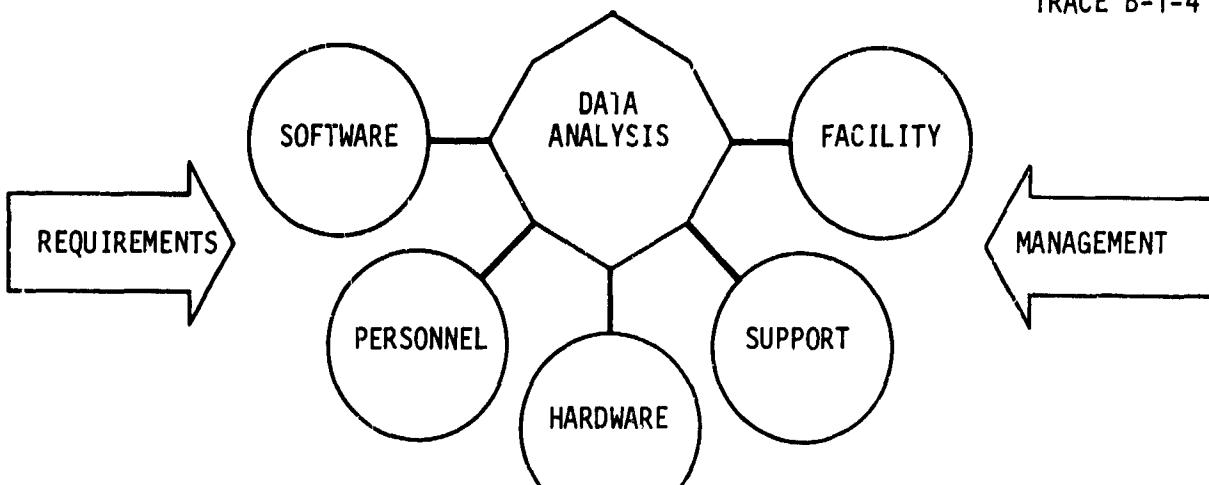
TRACE A-5-3









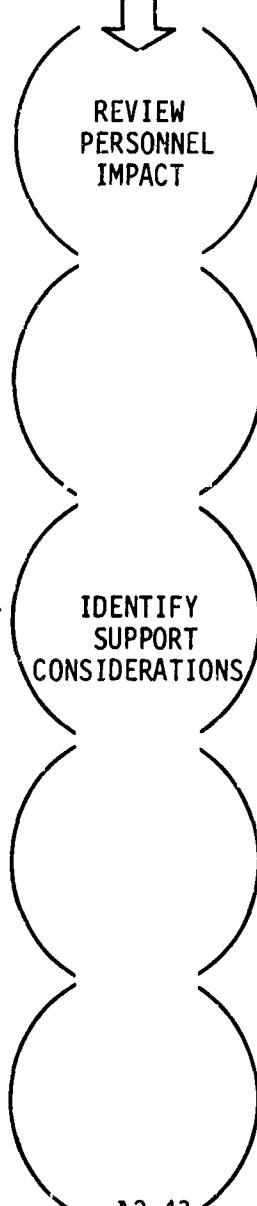
SAMPLE SYSTEM # 1

As the different physical characteristics of the display station are analyzed, the training, comfort, and safety aspects of the operator interface must be evaluated for each configuration identified.

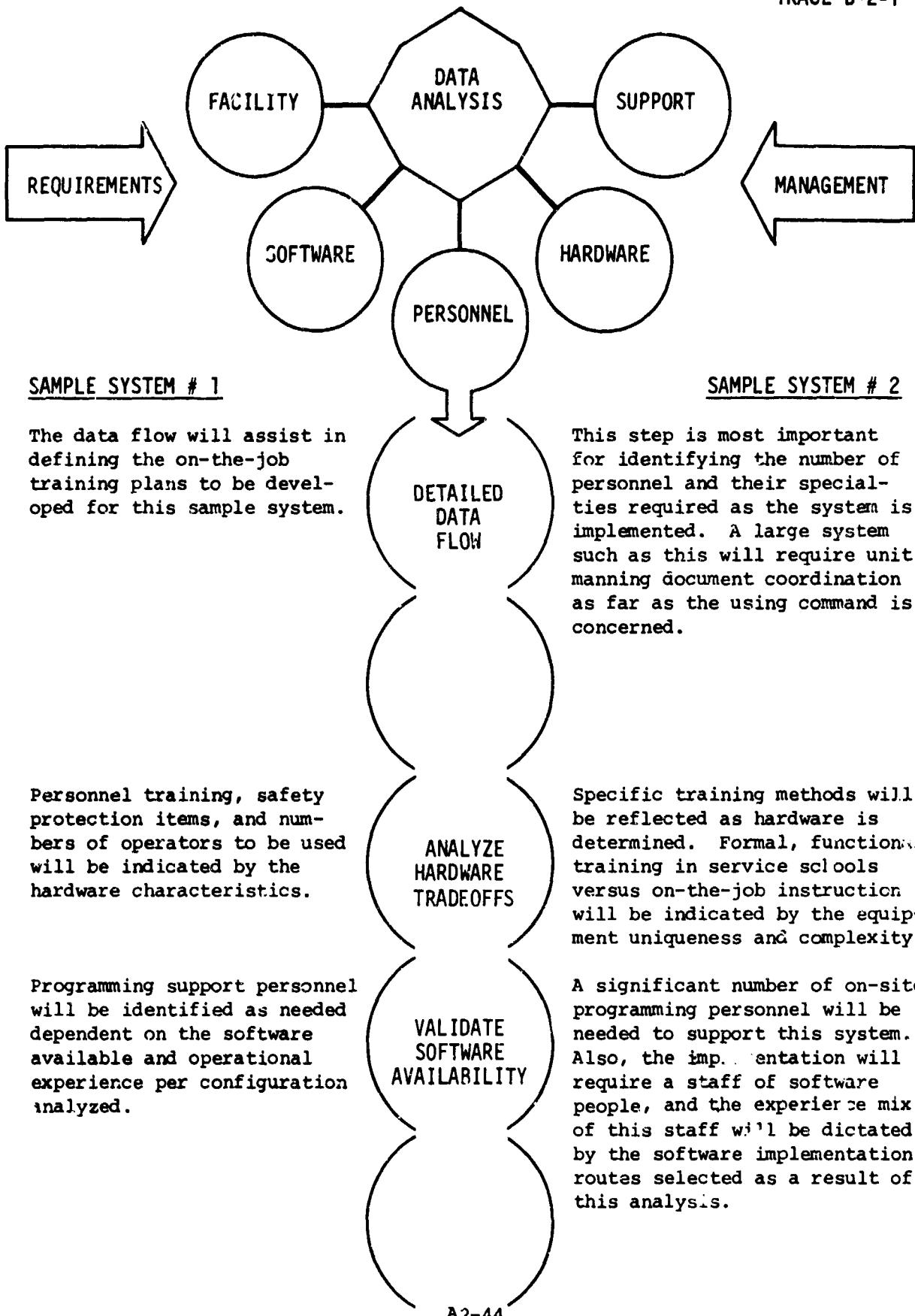
SAMPLE SYSTEM # 2

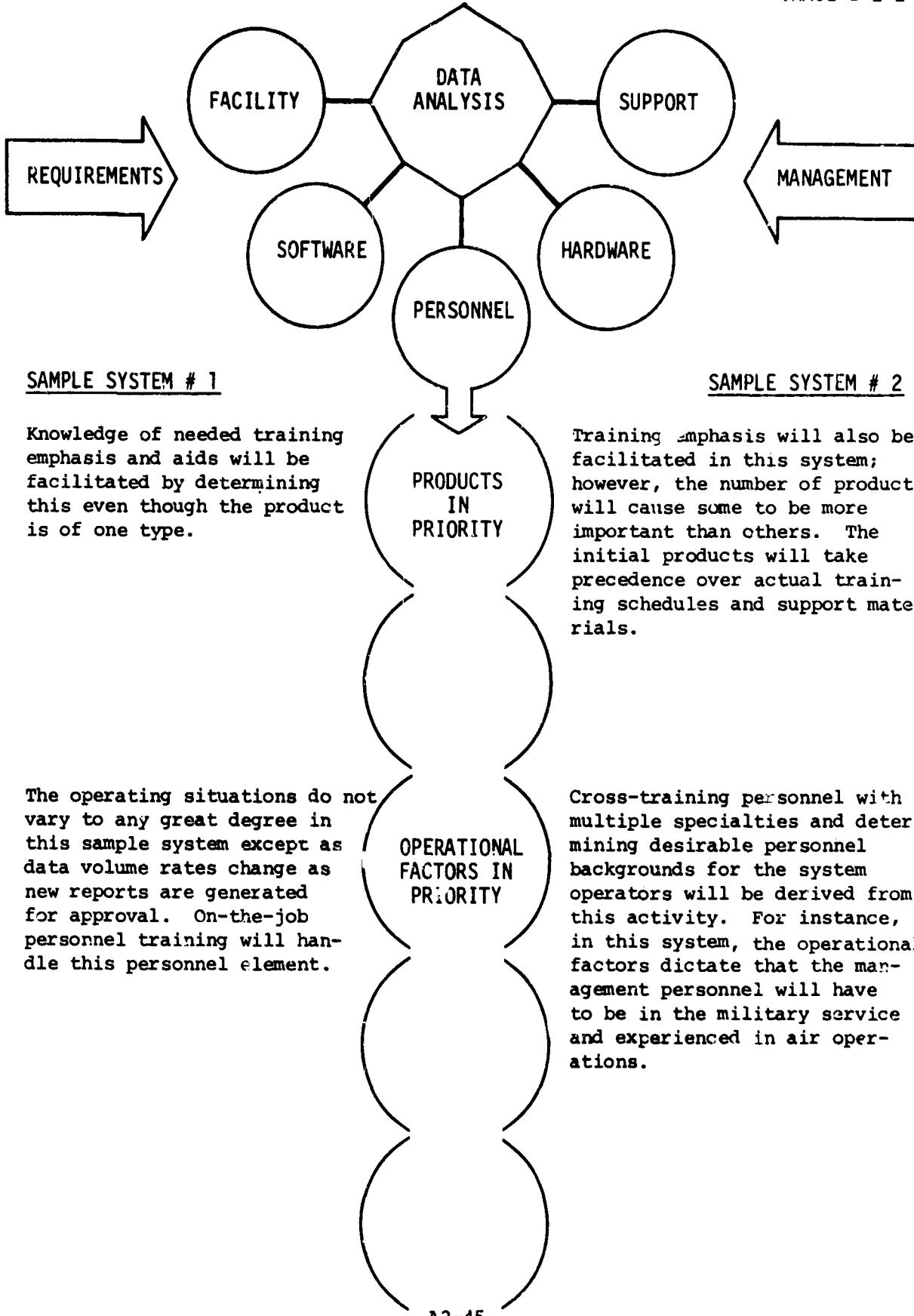
The lack of or the positive availability of trained personnel will affect the hardware complexity and number of operator stations planned. Realistic personnel factors must be included at this point. Coordination with the operational command is crucial at this time for this type of system.

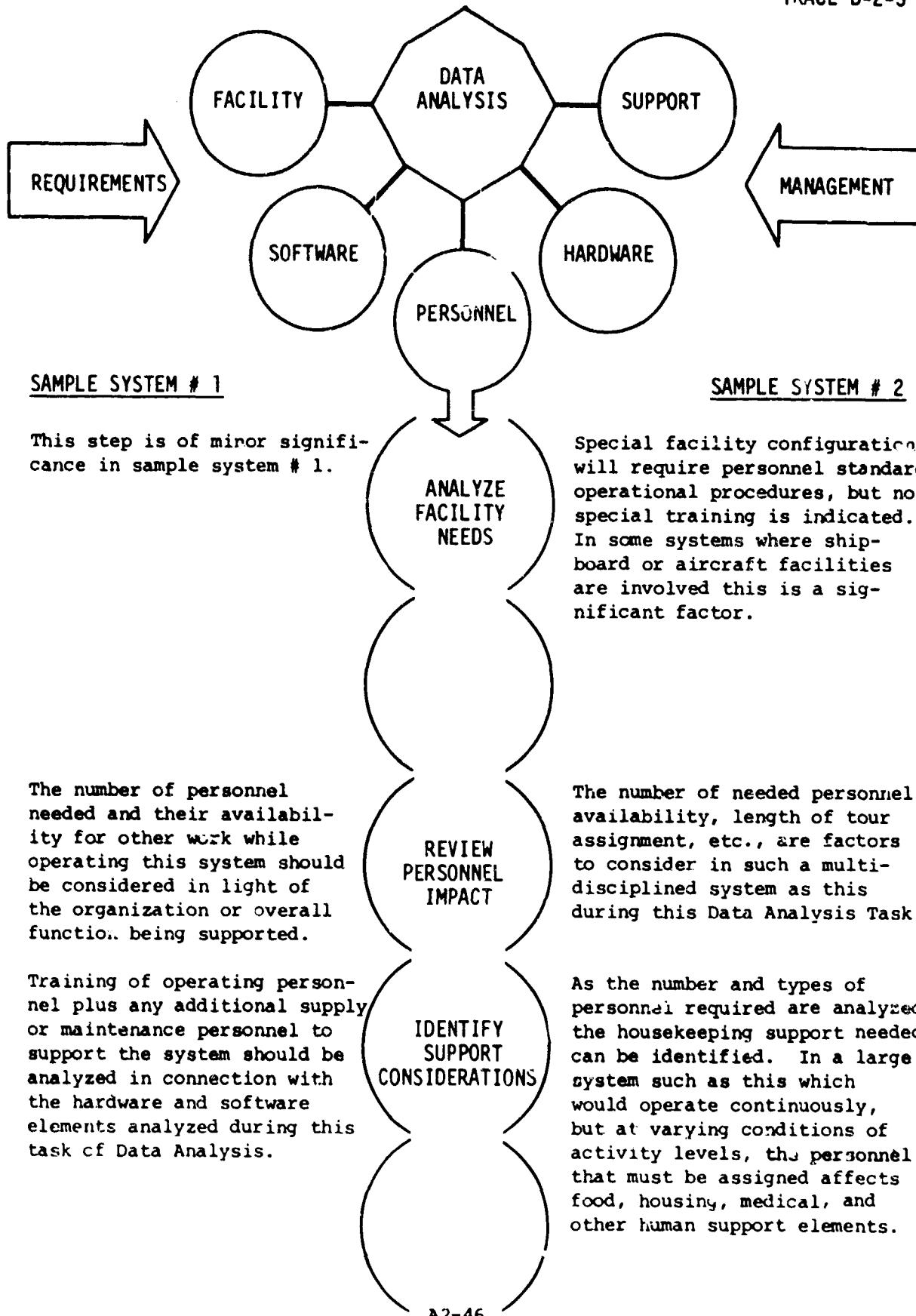
As specific station arrangements are considered and equipment reliability and identification data is developed, the supply and maintenance support needs must be compared to the acceptable conditions for support of such an item of hardware.

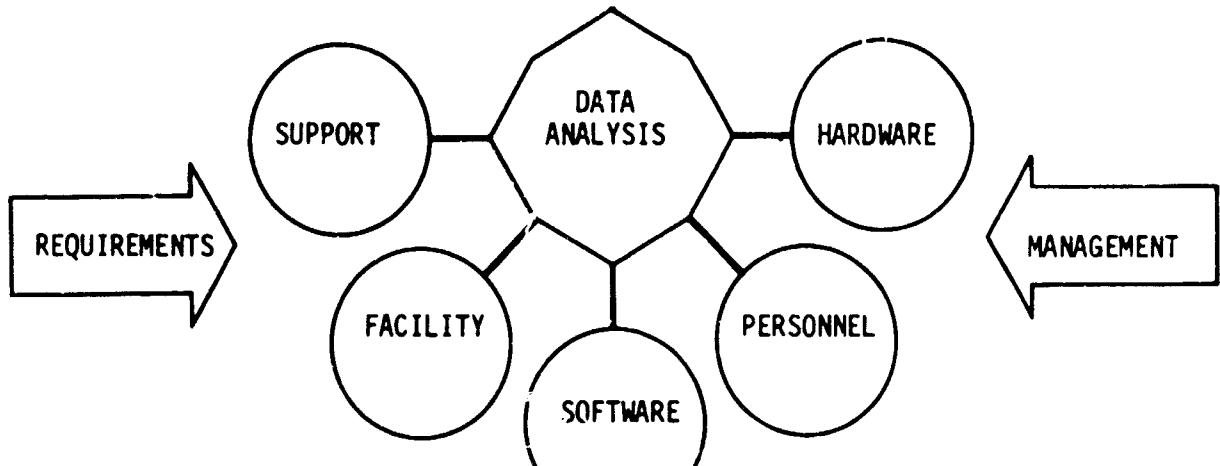


The detailed supply and maintenance programs needed to support the various categories of hardware elements should be recorded at this time. Coordination is needed with the user and logistic command organizations at this point. Hardware elements selected will be determined by the manufacturer-provided information about support needed per element.







SAMPLE SYSTEM # 1

The application programs will be identified by analyzing the points where it is a requirement for the operator to retrieve and store digital data.

SAMPLE SYSTEM # 2

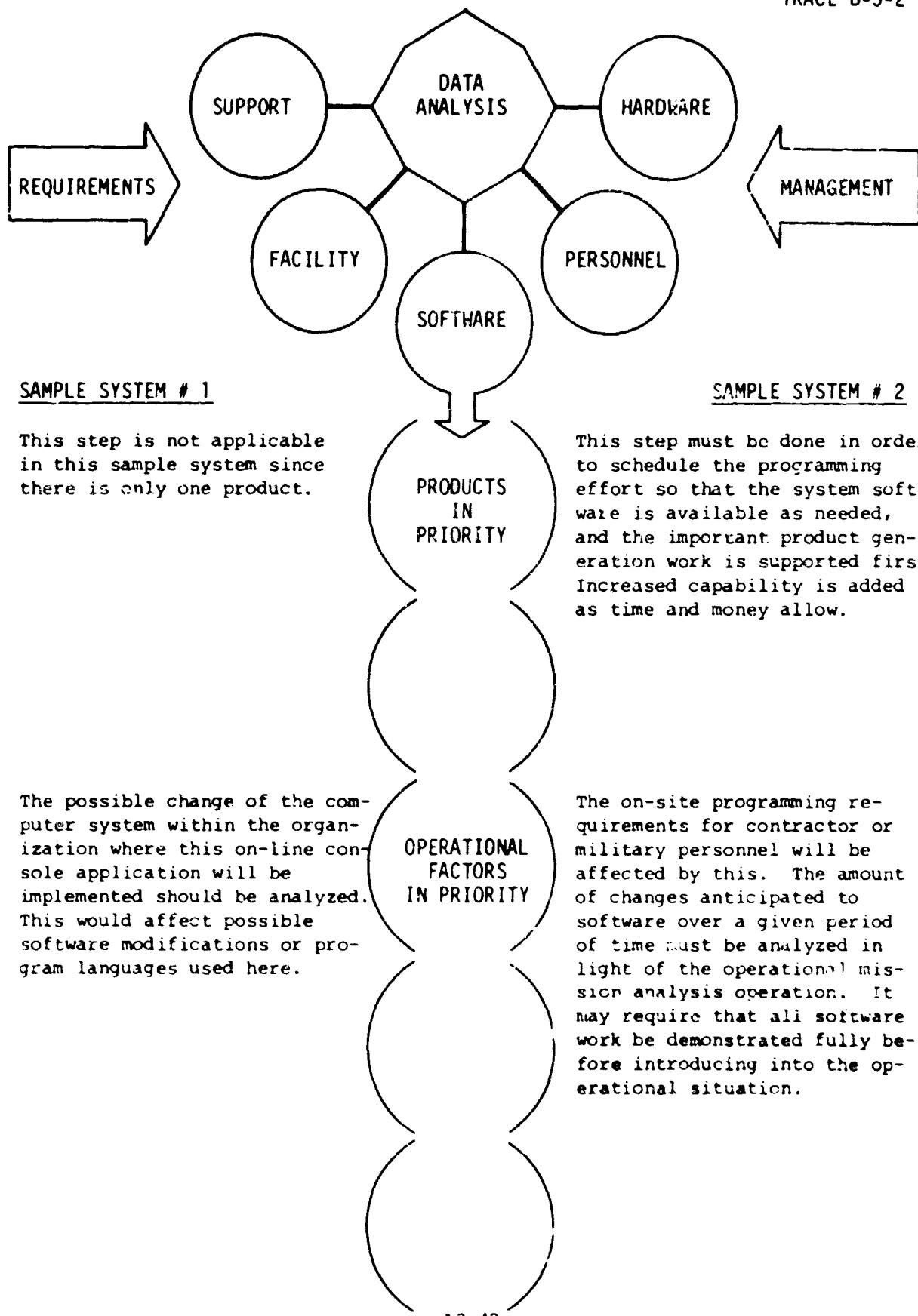
An analysis of the data flow will identify the many application programs needed to support on-line display stations, and will provide a basis for tradeoff decisions about automating certain procedures or performing them manually. Special station-oriented data flow procedures will indicate the file organization of data to be used at these stations which support mission analysis functions.

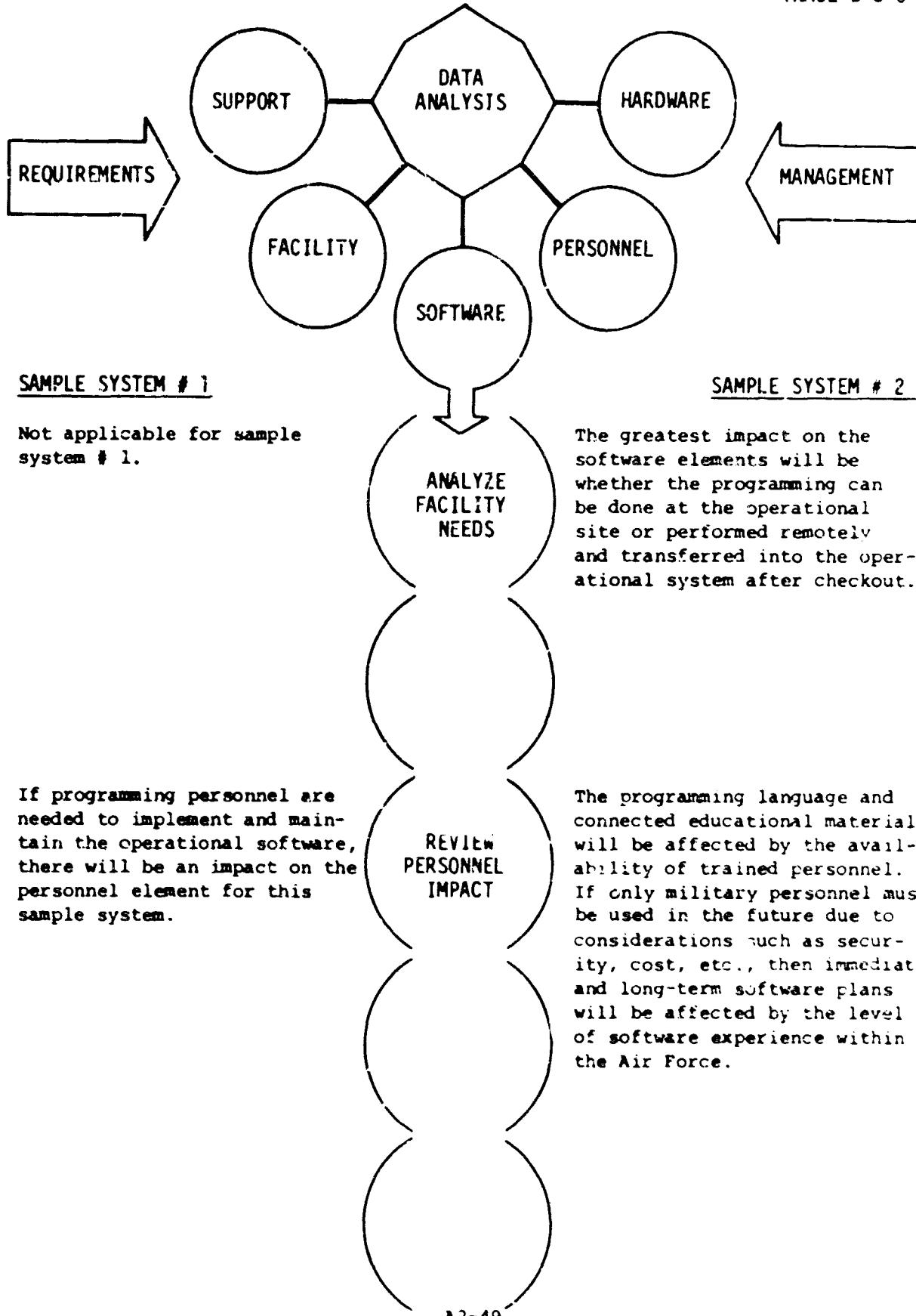
The hardware analyzed will help list the software available, and as a result, that software which is to be developed.

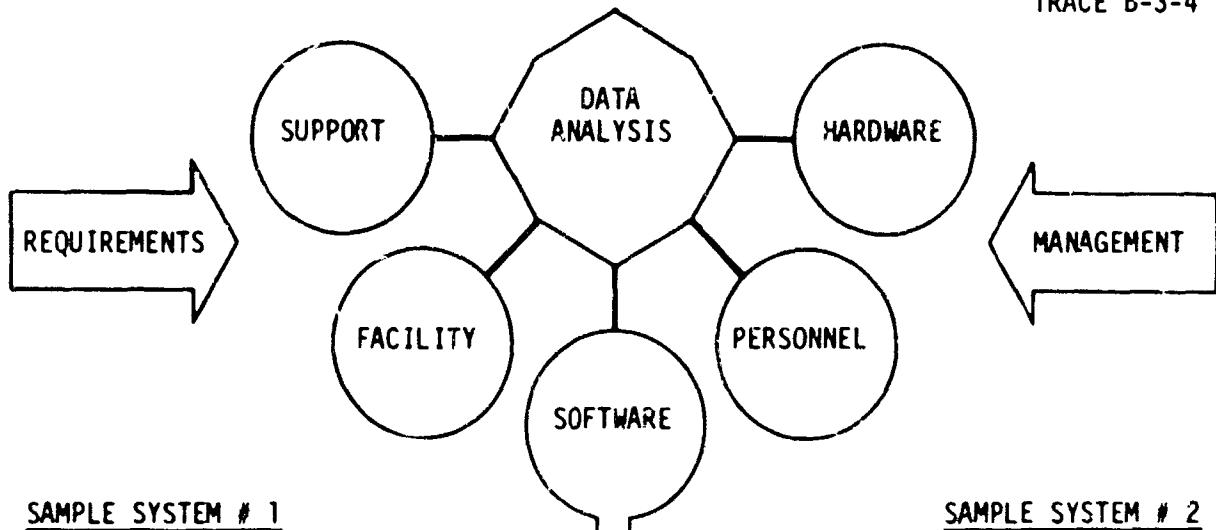
As specific hardware is analyzed and ranked in order of suitability, the software elements needed to compliment the hardware devices can be identified.

This will identify the method of producing the necessary programs needed as well as simply identify the programs related to the function to be performed.

In a large system such as this, the availability of programs to support various operations must be investigated. Since many functions are to be done in this system for the first time with on-line computer support, there will be a need for a large amount of original programming. Any useful, available, well documented conversion packages will help to reduce the software effort in a large system like this.



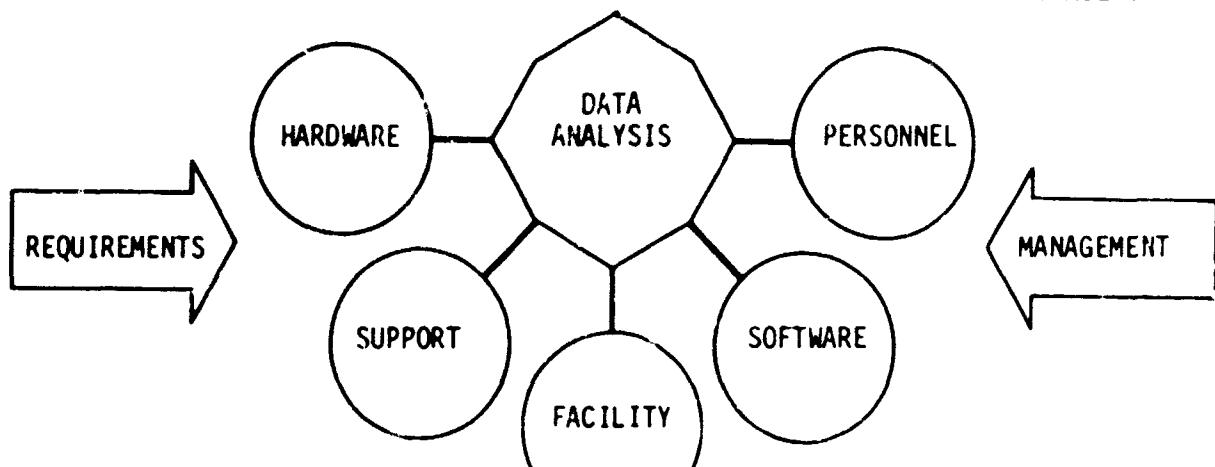


SAMPLE SYSTEM # 1

If application programs are to be developed there will be interim support given to programming personnel in the form of supplies and computer time. This in itself may help decide whether to use existing software or not.

SAMPLE SYSTEM # 2

Housing, transportation, safety precautions, and supply support available at operational mission analysis facilities will affect software implementation plans and later software maintenance activities. These, in turn, will affect the software used. Existing, well-known languages and programming methods may be advantageous over newer techniques which are difficult to maintain or change due to a lack of experienced support personnel that can be on-site during full operational status.

SAMPLE SYSTEM # 1

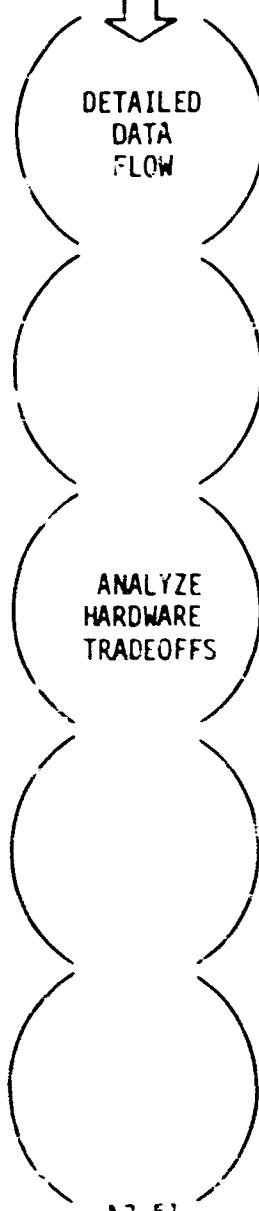
Not applicable in sample system # 1.

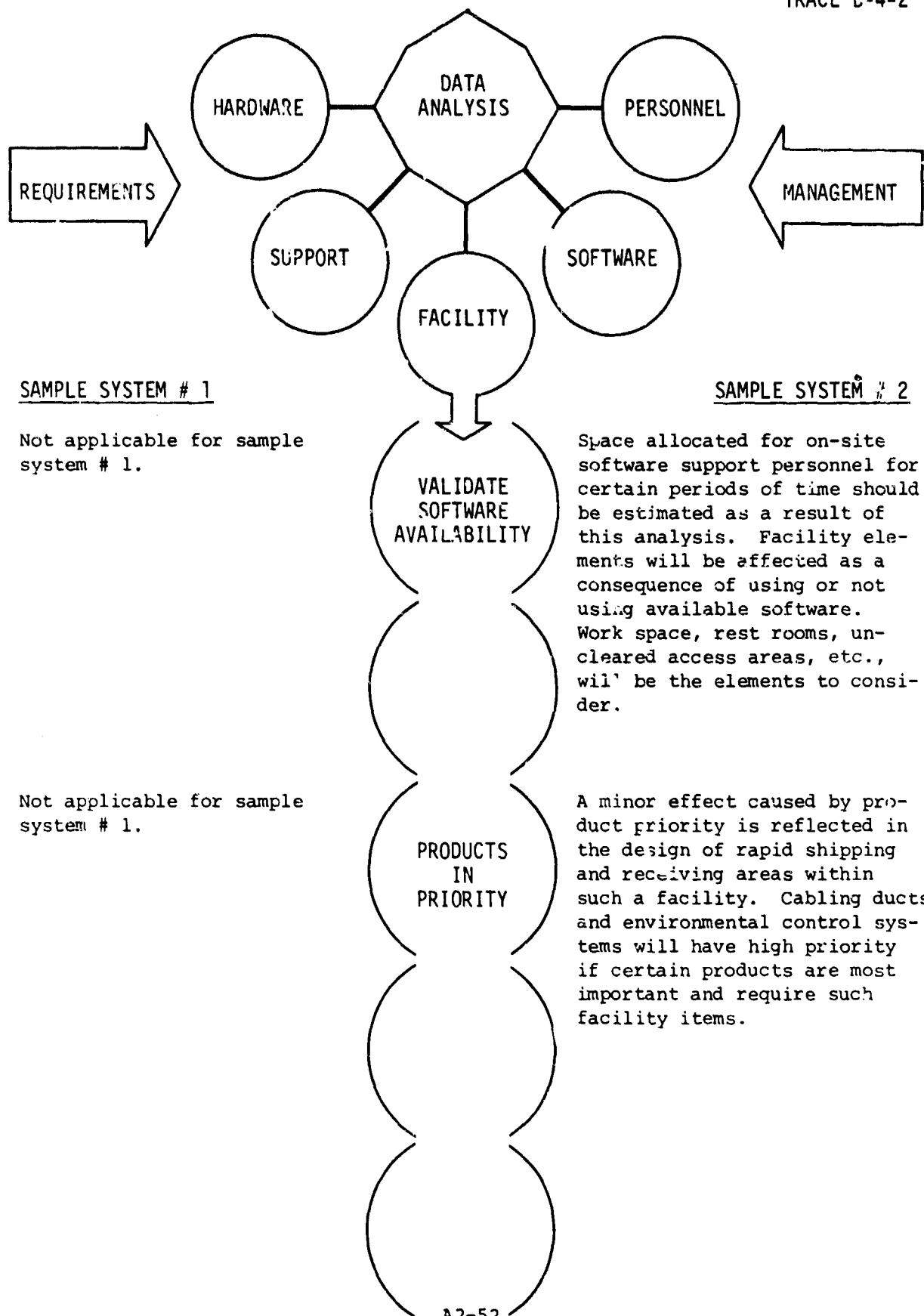
SAMPLE SYSTEM # 2

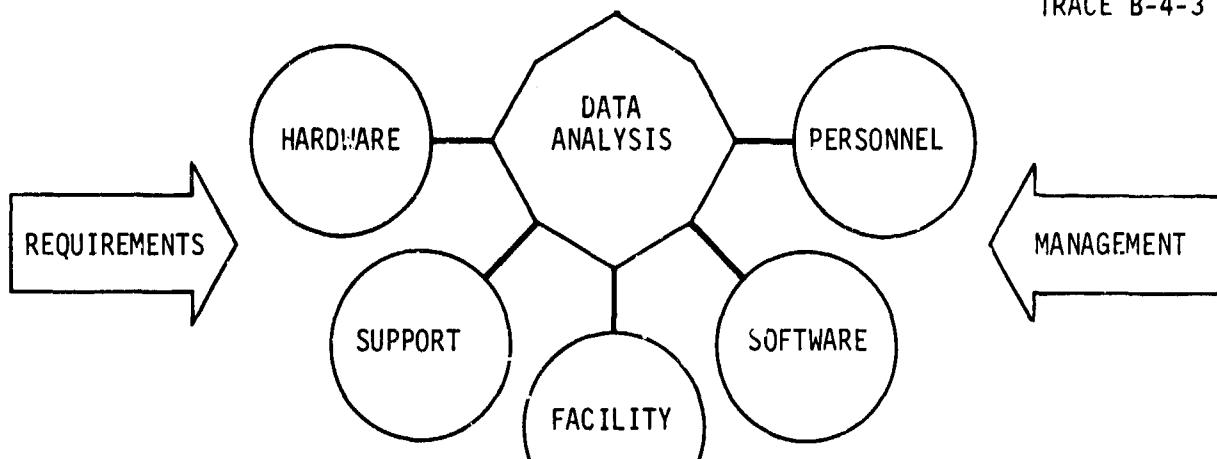
This is very significant in order to properly plan the internal facility layout. The method of receiving input data and shipping hardcopy products between work areas will be identified by analyzing the data flow. Facility drawings and cost estimates can only begin after this step has been performed for a large system.

Electrical shielding needs, noise control, and the hardware's physical characteristics will possibly affect floor modifications, type of wall paneling, or minor cable routing plans in this system.

The entrance doors, false floors, cable ducts, room sizes, shielding, etc., will be varied between areas within the facility housing the tactical mission analysis system. The hardware selected will help determine these variations.





SAMPLE SYSTEM # 1

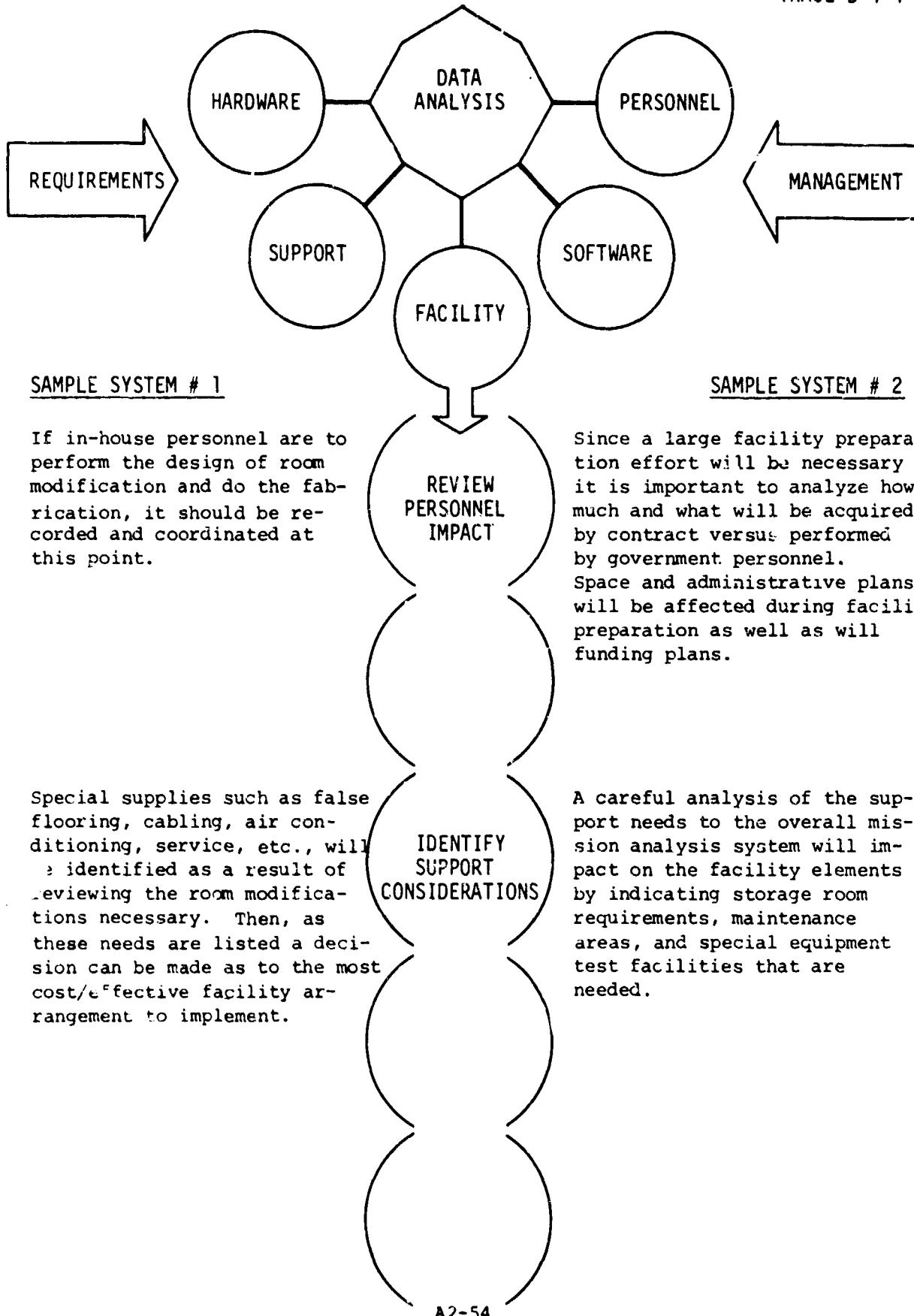
The overall operating environment factors inherent in the facility to be used may require modifications to the room where the display work station is to be located. Many people moving about for instance, could indicate a need for sound proofing or special partitions to reduce ambient light.

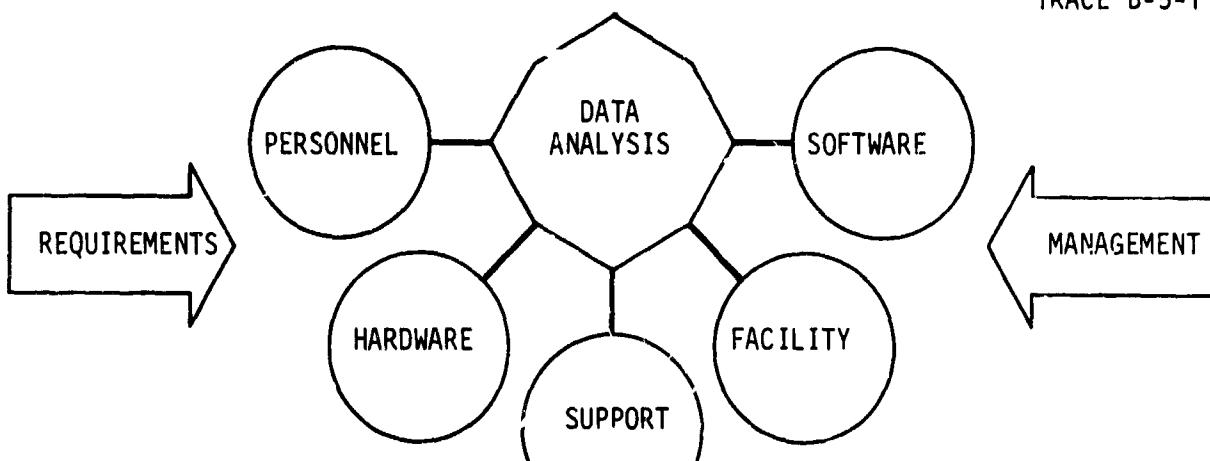
This is directly applicable and sums up all factors that will affect the facility elements. At this point, time and cost factors for facility work should be identified.

SAMPLE SYSTEM # 2

Climatic conditions, the military combat situation, mobility requirements, and security needs all affect the facility elements for such a system. If the mission analysis is to be conducted in movable shelters in support of a deployable wing of aircraft, the facility elements would be much different than at a fixed base of operation where permanent buildings can be used.

This is directly applicable and sums up all factors that will affect the facility elements. At this point, time and cost factors for facility preparation will be identified. In a large system such as this, the facility data may have to be analyzed by distinct functional areas if there are separate work areas allocated within the initial overall facility plans.



SAMPLE SYSTEM # 1

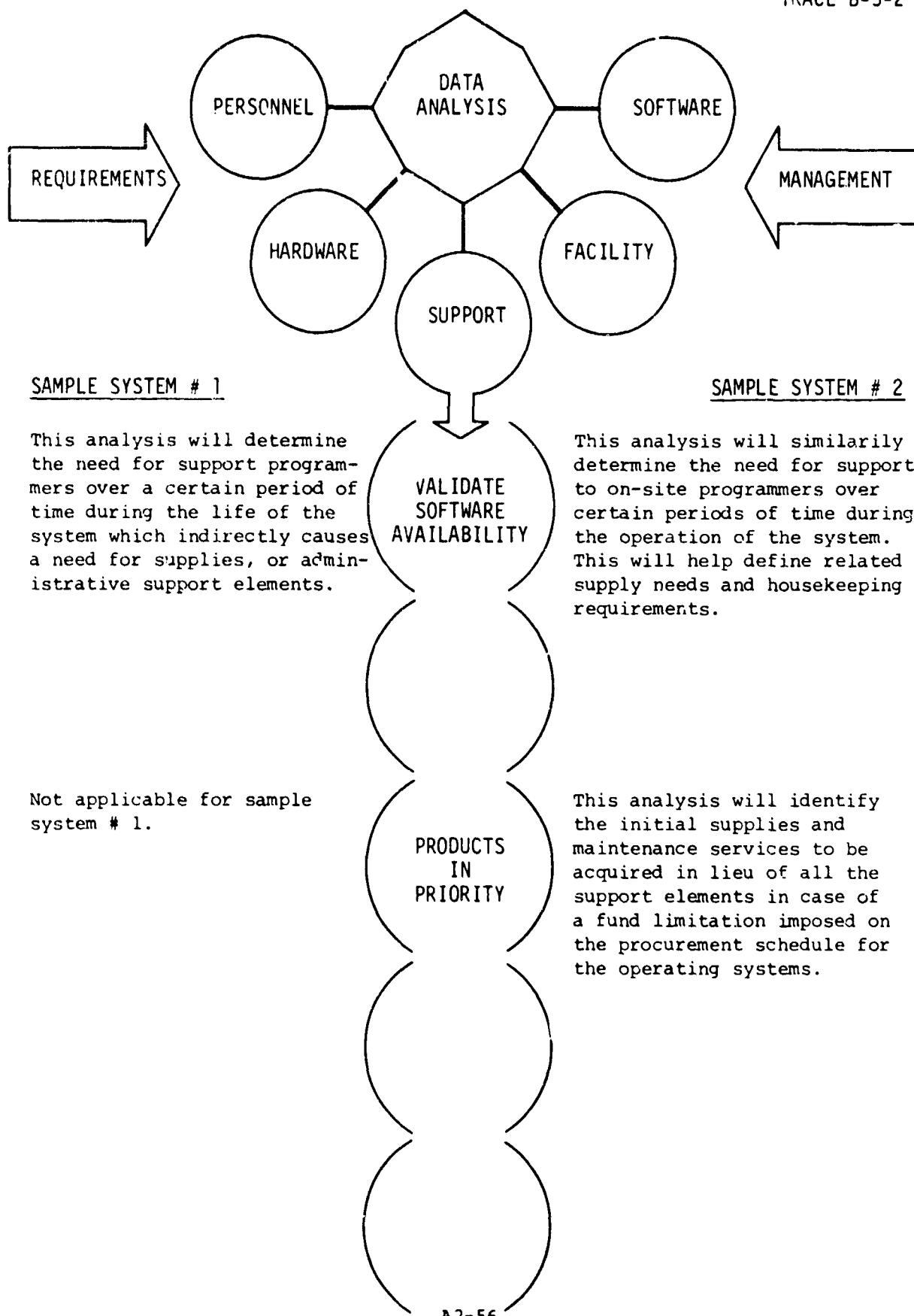
A few minor supplies may be identified as a result of analyzing the data flow carefully. Reference documentation is one element of support that will be needed to guide the operator's activities at the console station.

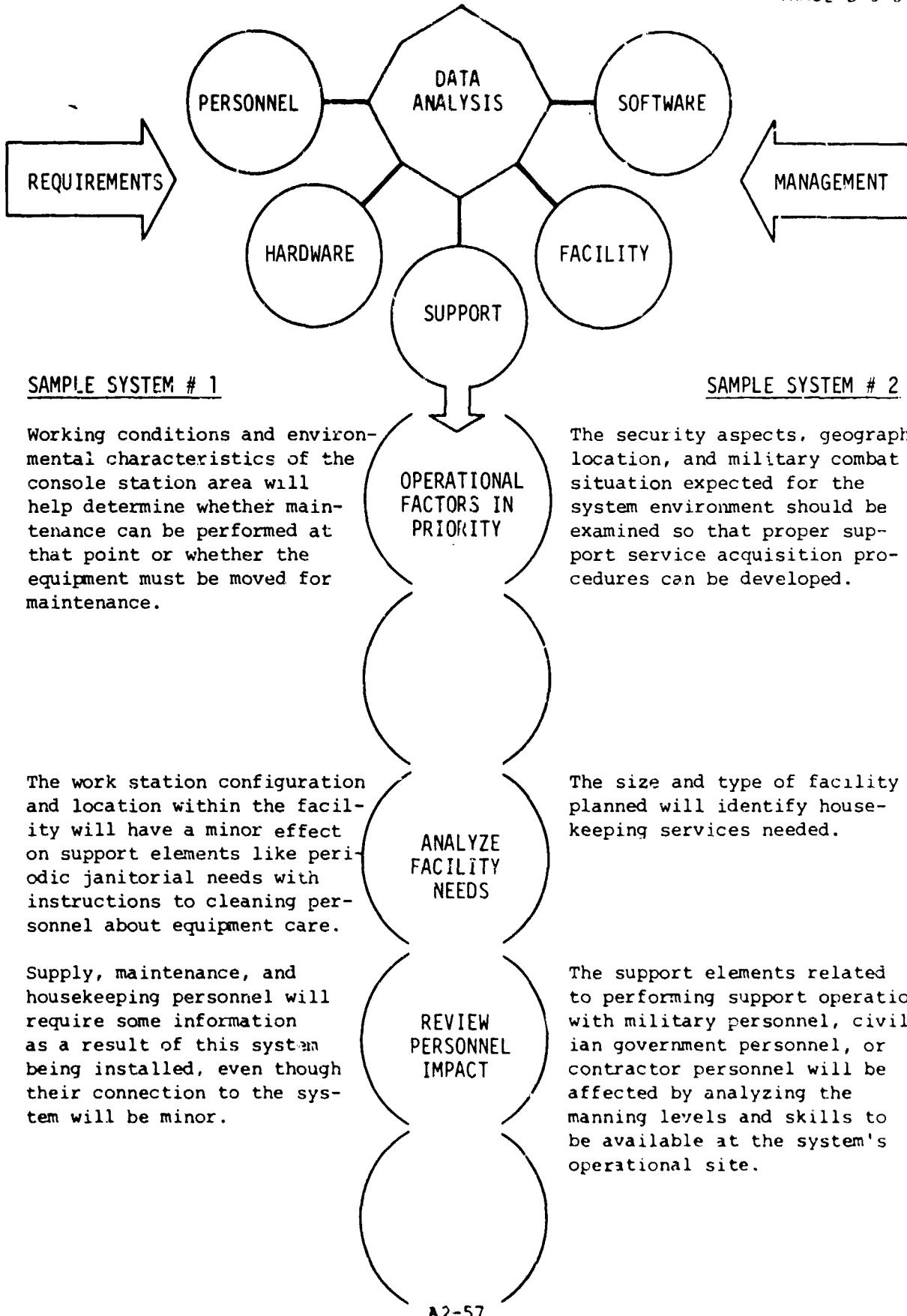
SAMPLE SYSTEM # 2

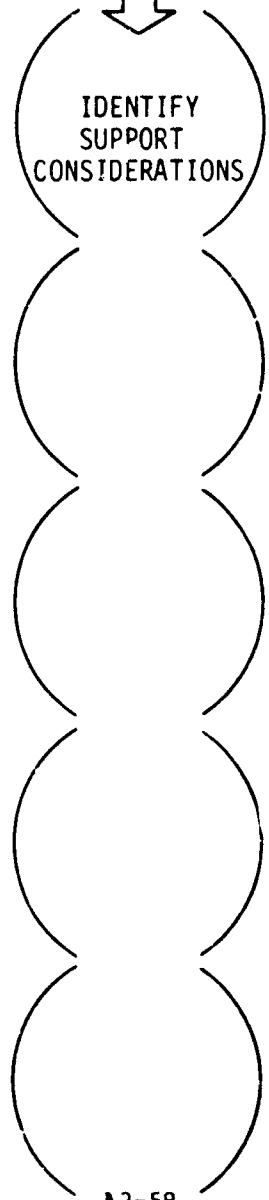
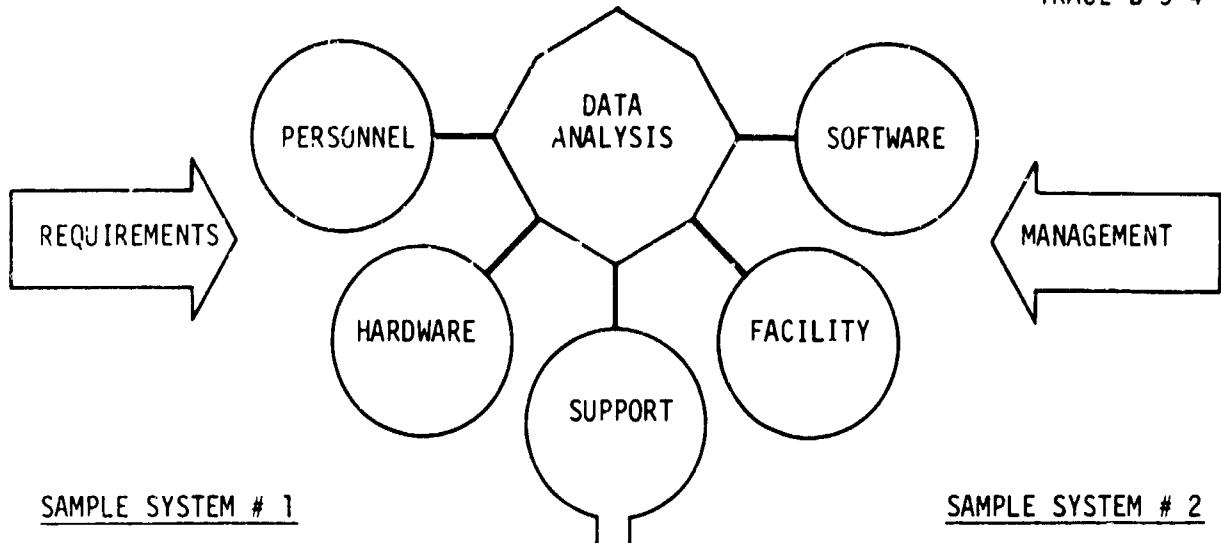
The data flow will be very important in this system for analyzing the supply trade-offs as a result of identifying supply needs. Maintenance plans and reference document preparation plans will be key support elements that should be initiated at this time.

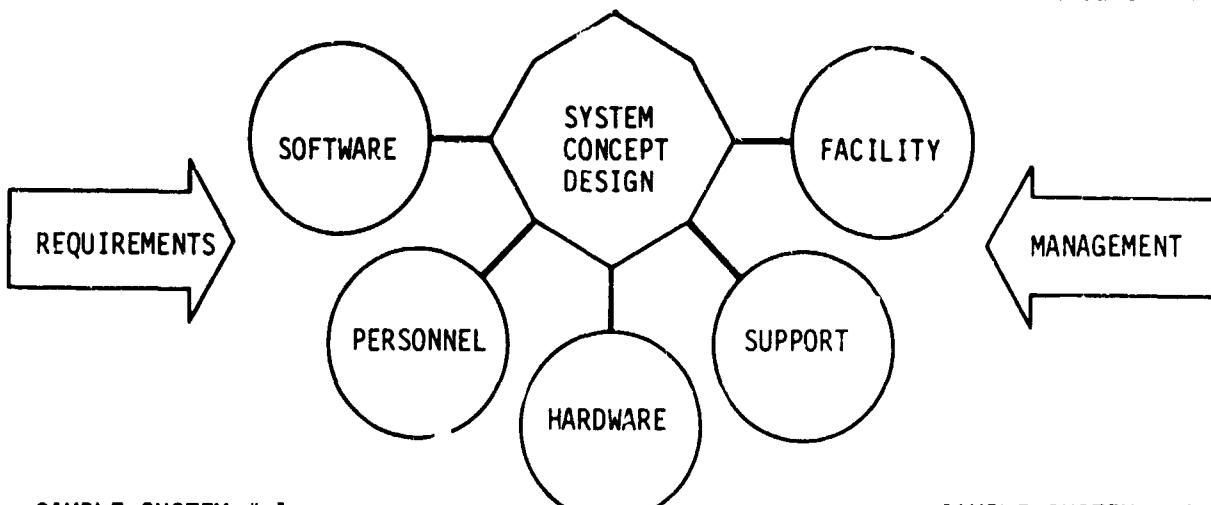
There will be a minor effect on support elements, dependent on the console selected. Reliability, experience, and amount of time the hardware has been in mass production will provide information which will affect support elements needed, such as new reference documentation needed or confidence that proven, complete documentation is available.

Since a great number of complex equipments of different types will be included in this system, a careful analysis of their supply, maintenance, and reference documentation needs is warranted in order to sum up hardware-related support elements.







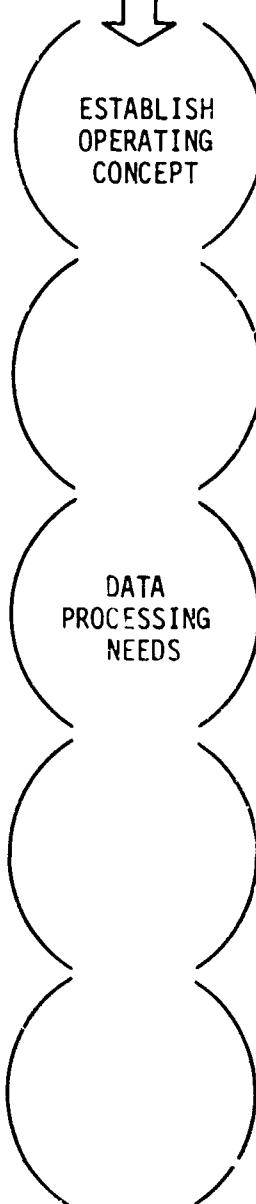
SAMPLE SYSTEM # 1

The operating concept has already been established at the point of project initiation for this sample system. The CRT display console work station has been directed from the beginning.

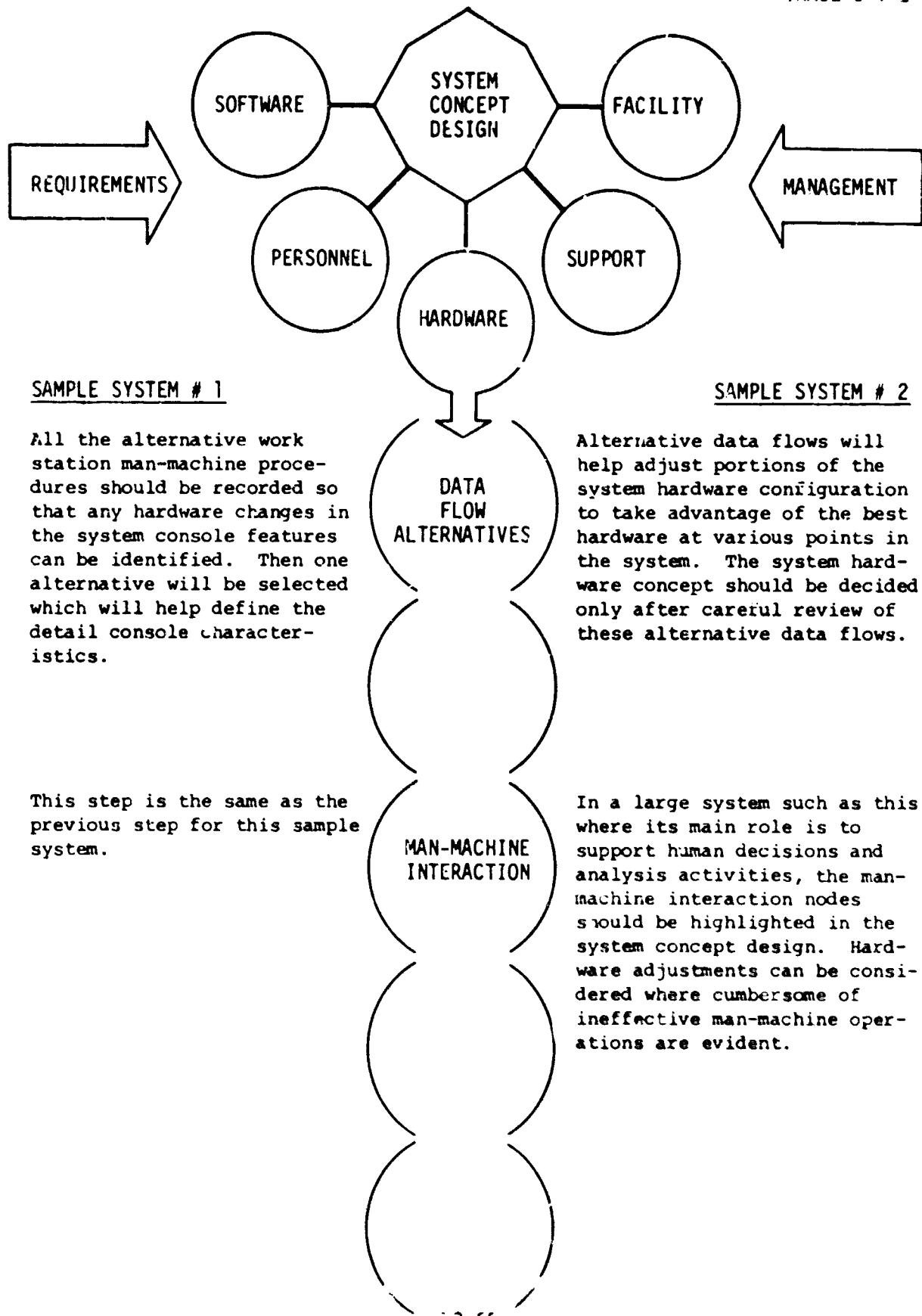
SAMPLE SYSTEM # 2

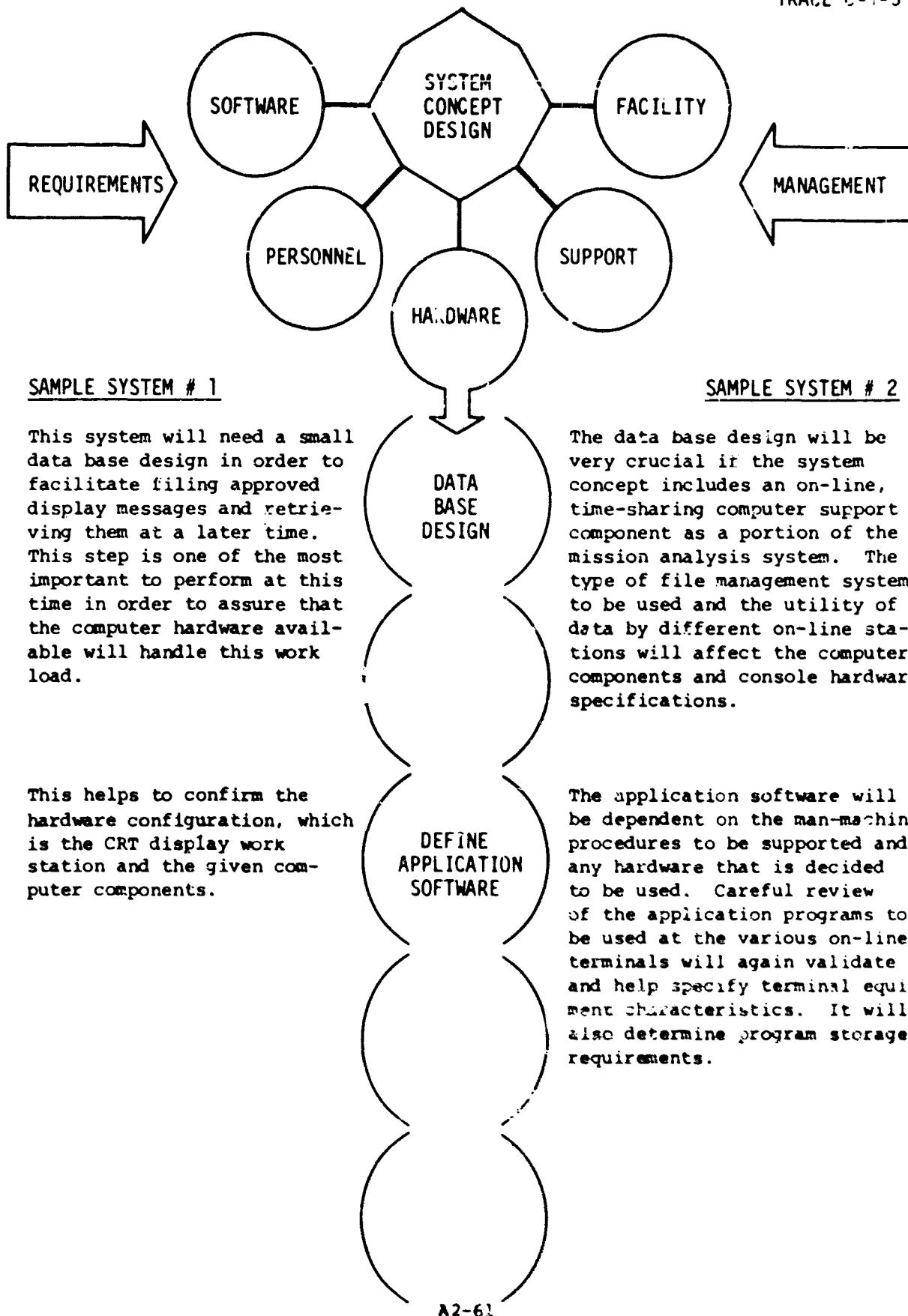
The overall operating concept is very important to record at this point for coordination purposes. Many types of equipments will have to be interfaced through manual operation or direct automatic connection. At this point individual hardware performance characteristics can be compared to the performance for each item as derived from the system configuration when connected or arranged as an integrated system.

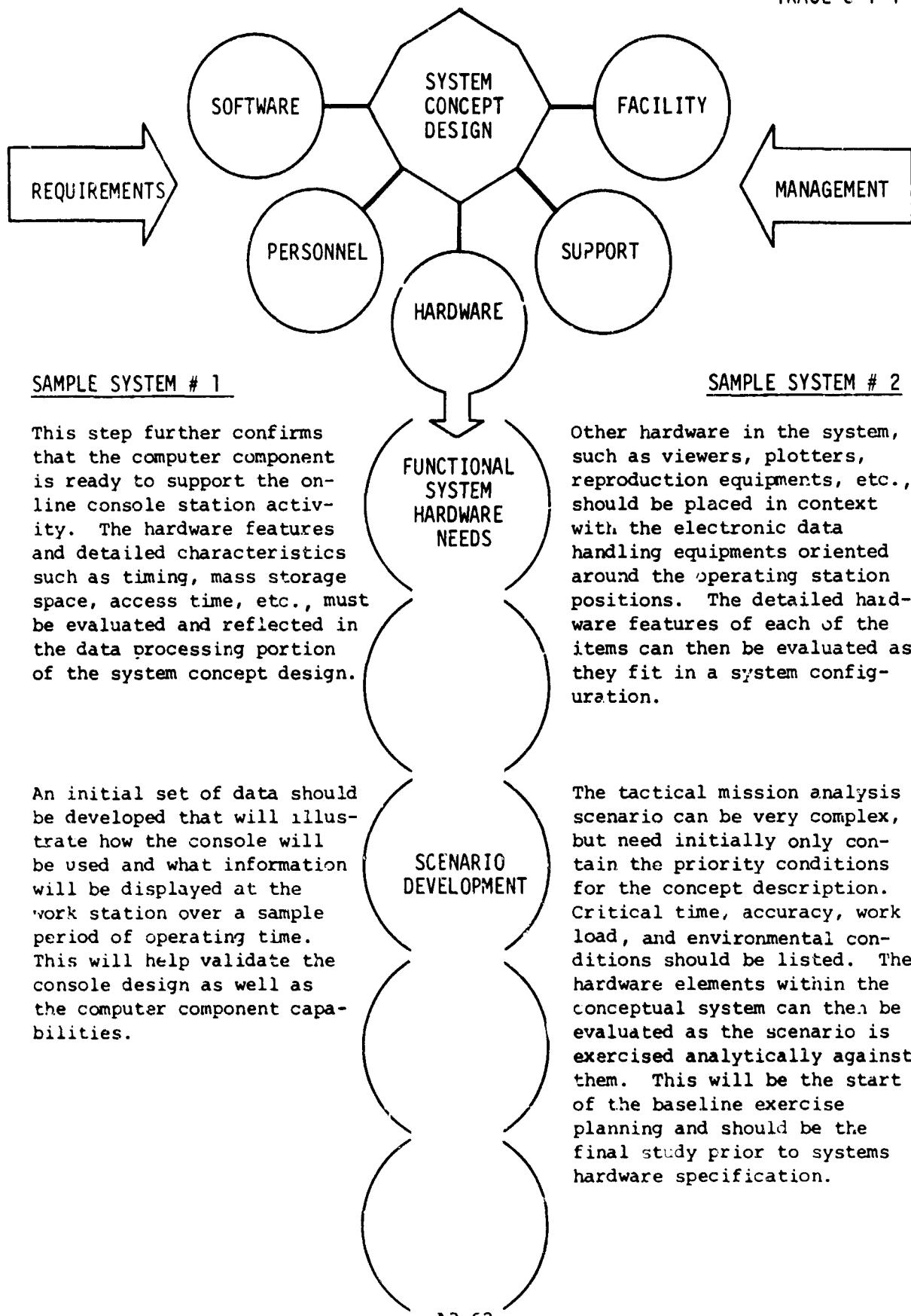
An analysis of data rates, program needs, and operating conditions imposed on the available computer may result in a need for special buffer or interface components. This should be decided in this step by illustrating and describing the data processing needs for the system concept design.

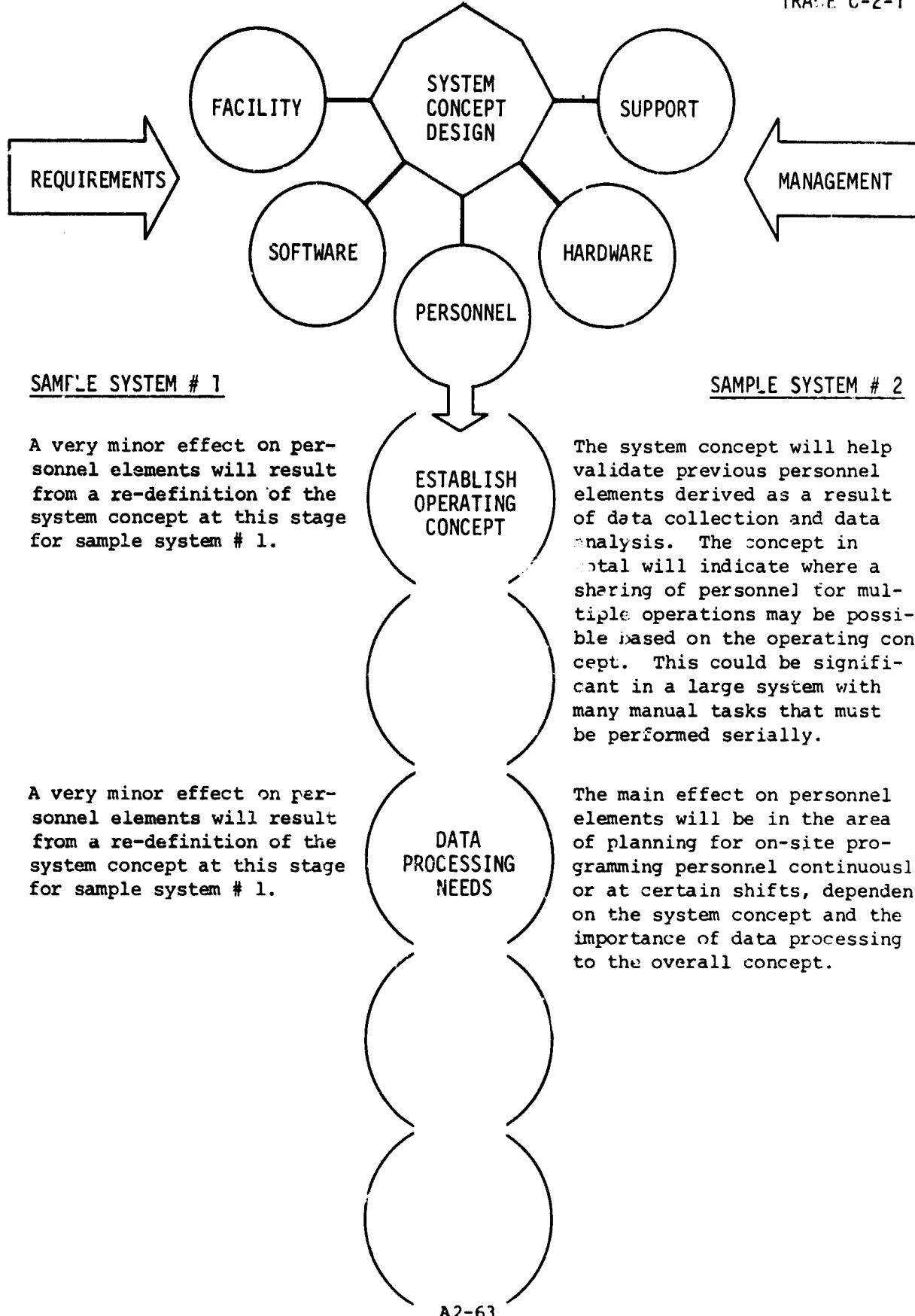


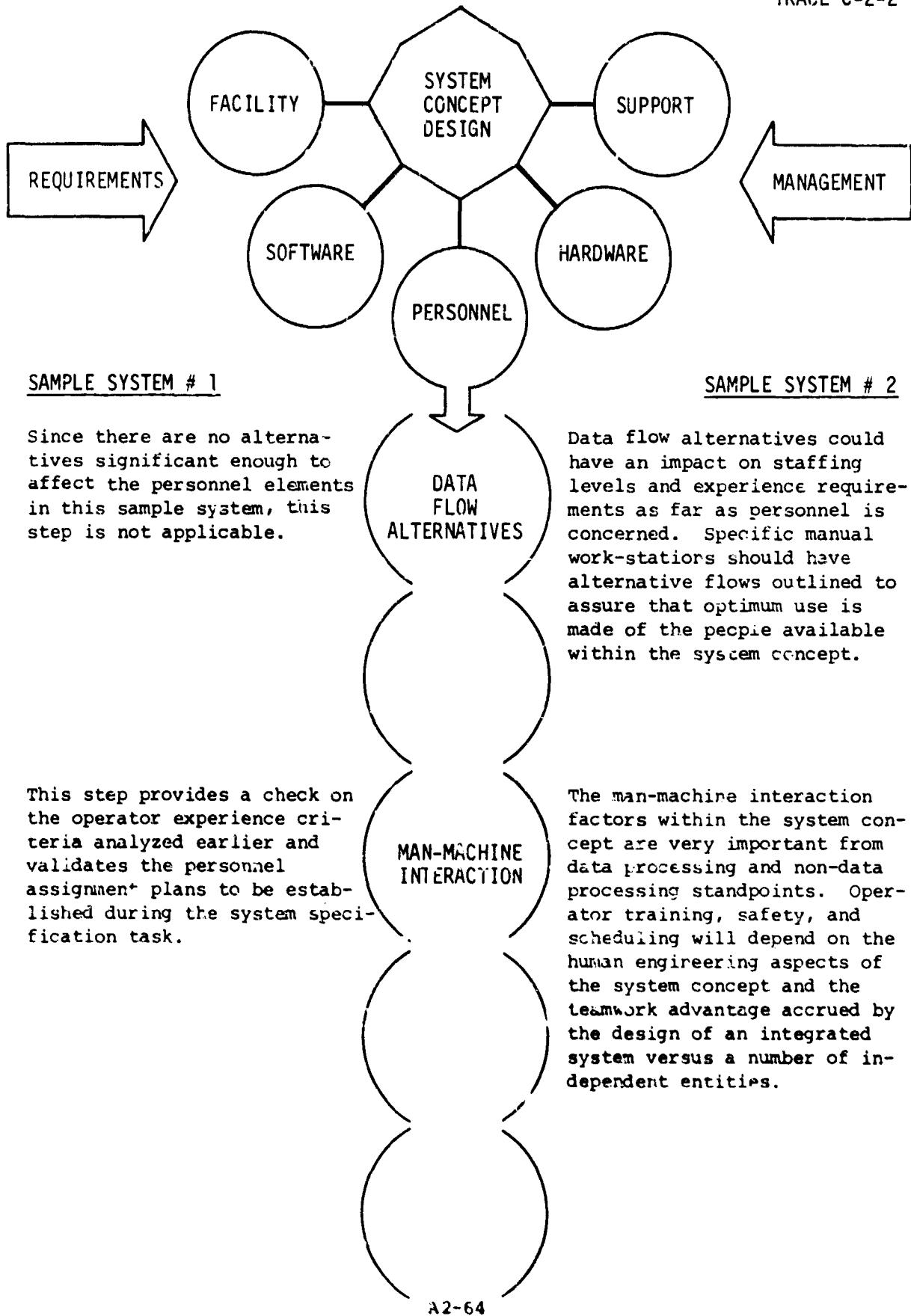
The data processing needs will be summarized into a system concept in order to decide the amount of on-line time-sharing processing support and the off-line, batch processing support to be used in this system. The data processing hardware selected will also be affected by this activity and resulting decisions.



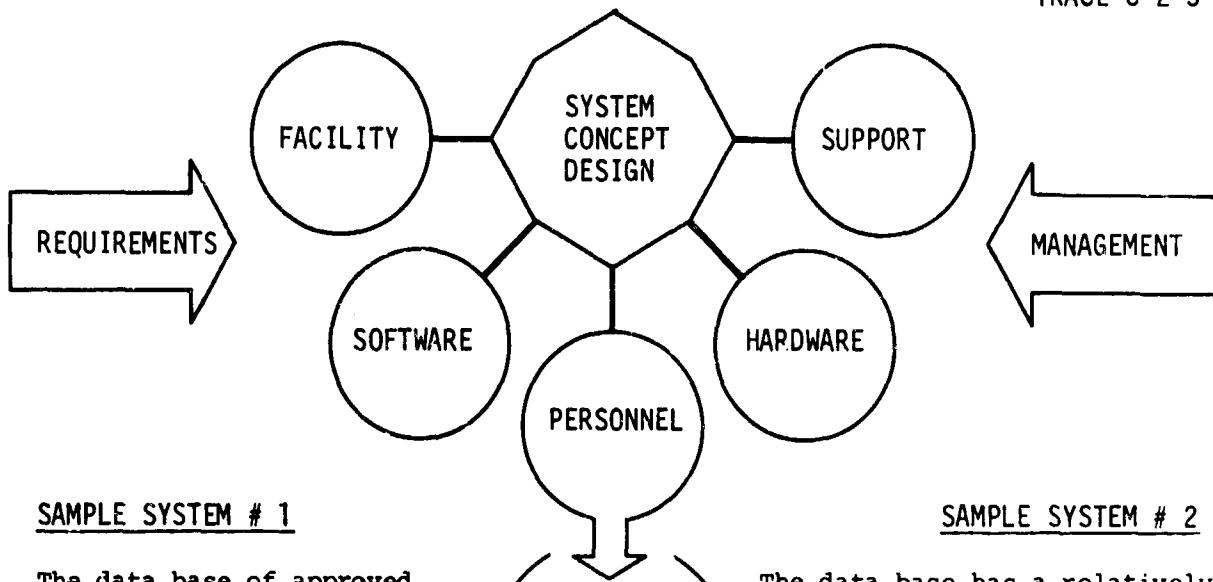








TRACE C-2-3



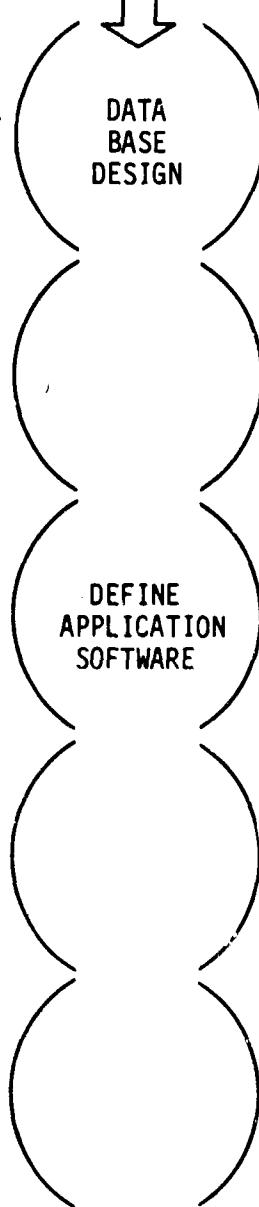
SAMPLE SYSTEM # 1

The data base of approved display messages is important to place in context with the console operation and computer components considered as one system. Any problems due to data base needs of the operator not being provided by the envisioned system should be highlighted here in order to adjust the other elements within the system concept.

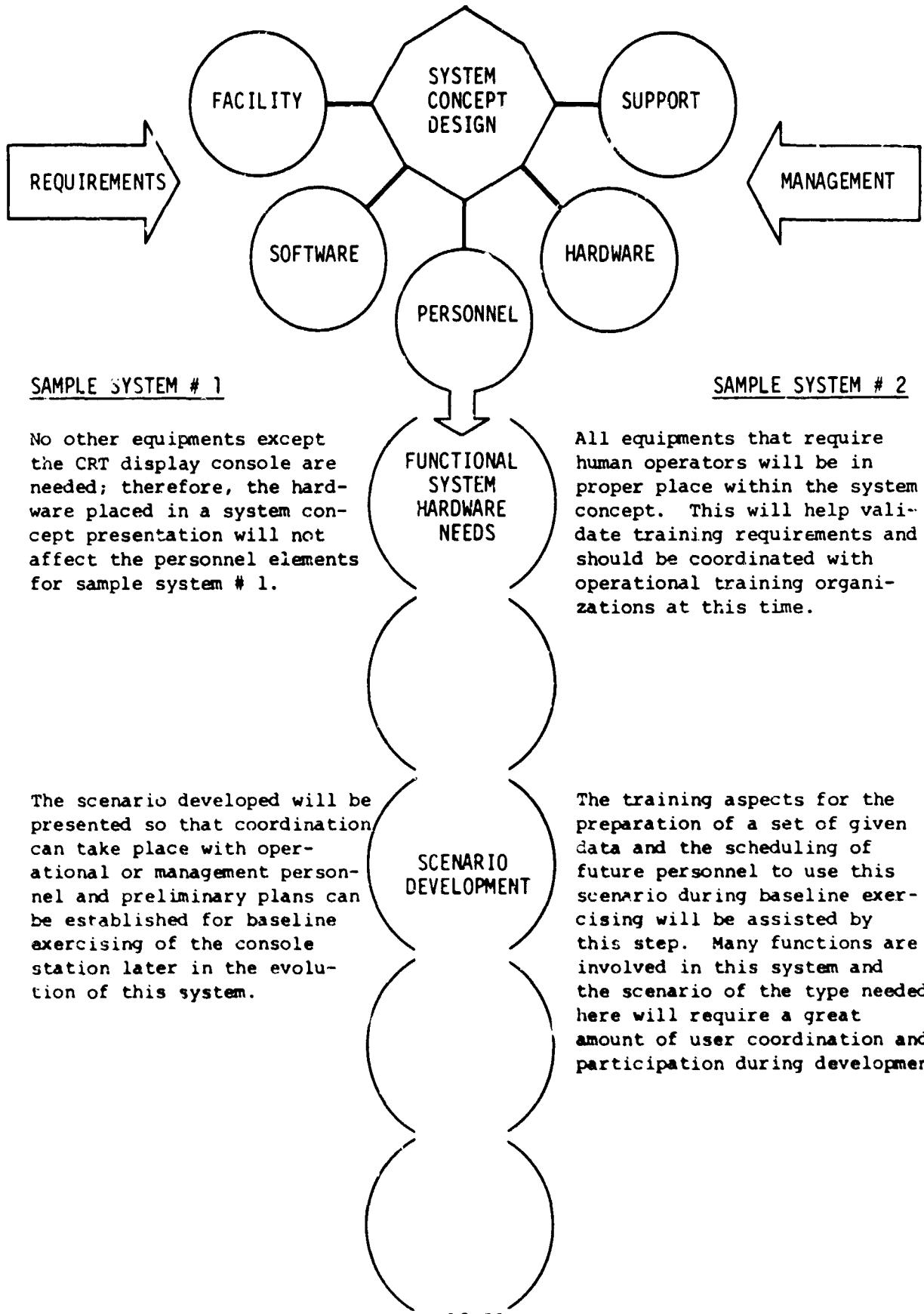
This is not applicable for its effect on system personnel elements for sample system # 1.

SAMPLE SYSTEM # 2

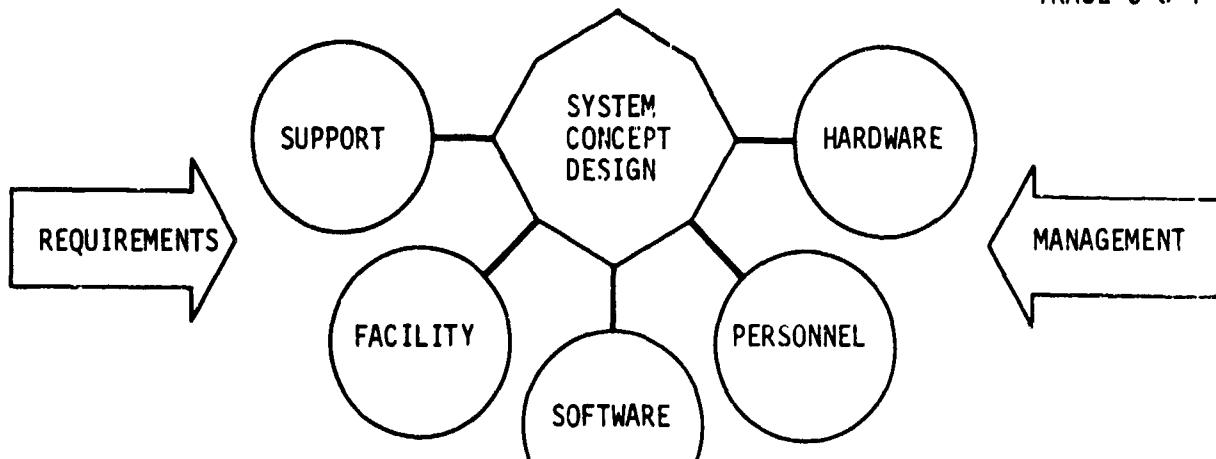
The data base has a relatively minor impact on personnel, except from a standpoint of manually creating the initial set of files. The stations' operating procedures will be impacting on the data base. Here, the data base should be developed with the personnel procedures in mind.



This step does not affect the operational personnel to any extent. It does indicate who must produce the application software as the programs are established within the system concept and helps decide whether an experienced software staff is available or unavailable.



TRACE C-3-1



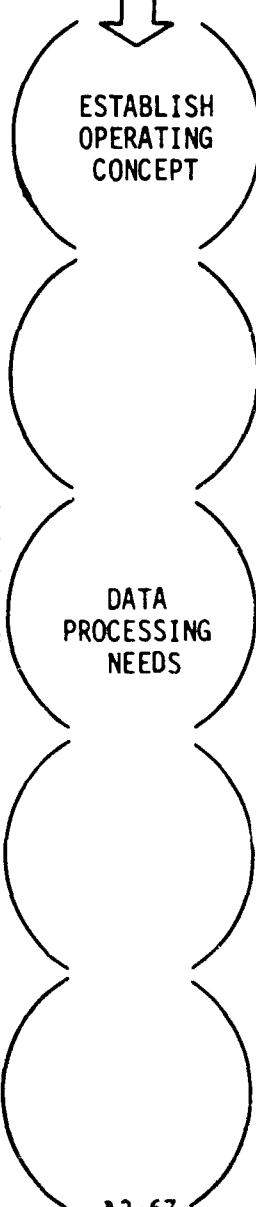
SAMPLE SYSTEM # 1

The data processing concept, i.e., tape storage, disk storage, file system concept, and the console operator language concept will affect the software to be developed for this sample system. The system concept design will help tie the operating system and application program areas together.

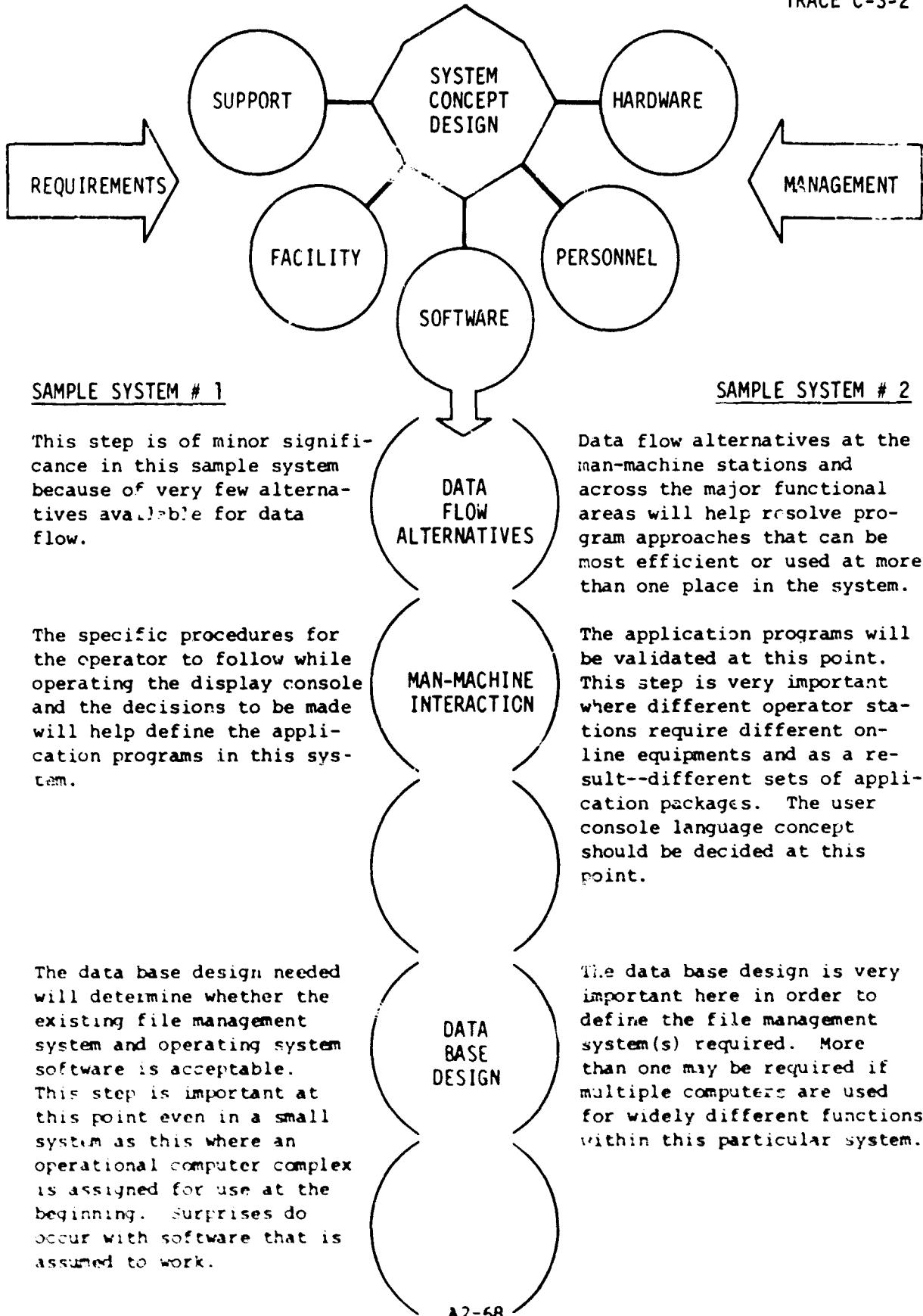
SAMPLE SYSTEM # 2

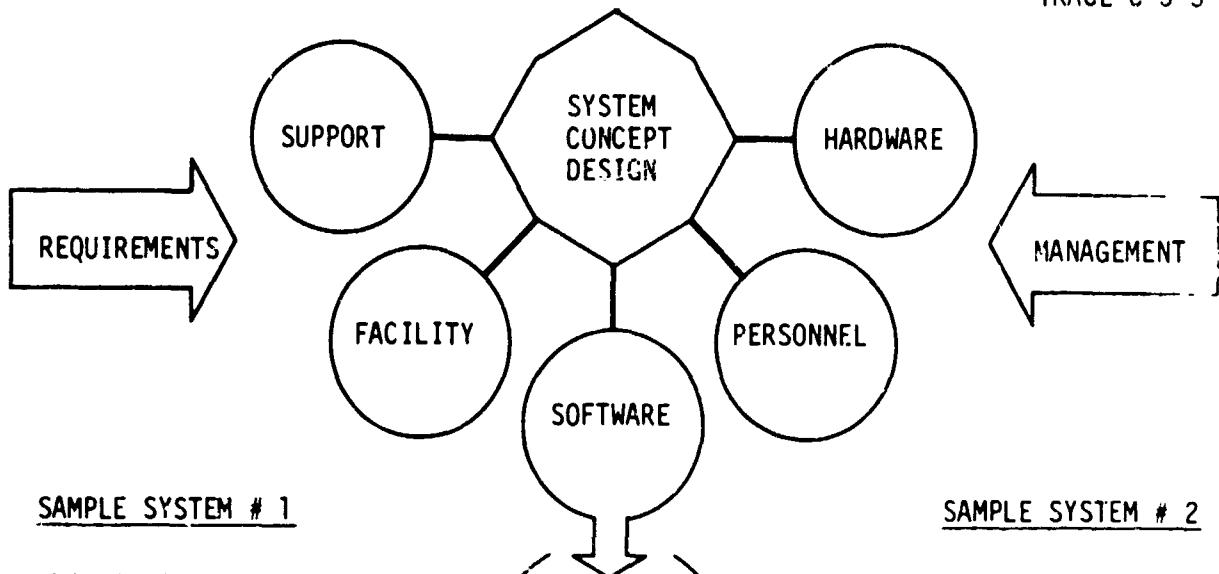
This will be a significant step towards indicating the system software and the many application software packages to be provided. The operating concept will indicate the relative importance and place of time-sharing versus batch type software packages.

This step will identify those program packages to be provided by assuring that the candidate available software packages do or do not fit the overall concept.



This step will result in a summary of application software routines and operating software concepts to be further specified in the next task. This step must identify the number and frequency of program interrupts anticipated in the on-line time-sharing user situations in order to specify the computer components' data transfer philosophy.



SAMPLE SYSTEM # 1

This is directly applicable to validate the software element specifications to be developed in the next major system analysis task.

This is not applicable in this sample system due to the fact that the given system only contains one CRT display console and no other functional equipments.

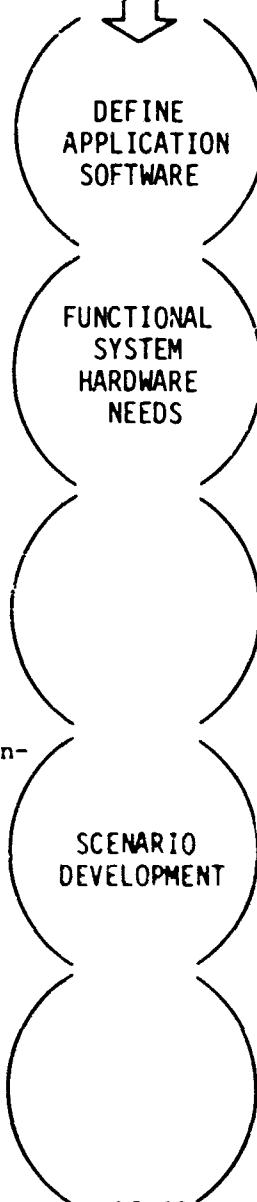
A pre-prepared file of environmental-related messages to be displayed on the CRT console will be defined within the system concept as a result of the scenario characteristics.

SAMPLE SYSTEM # 2

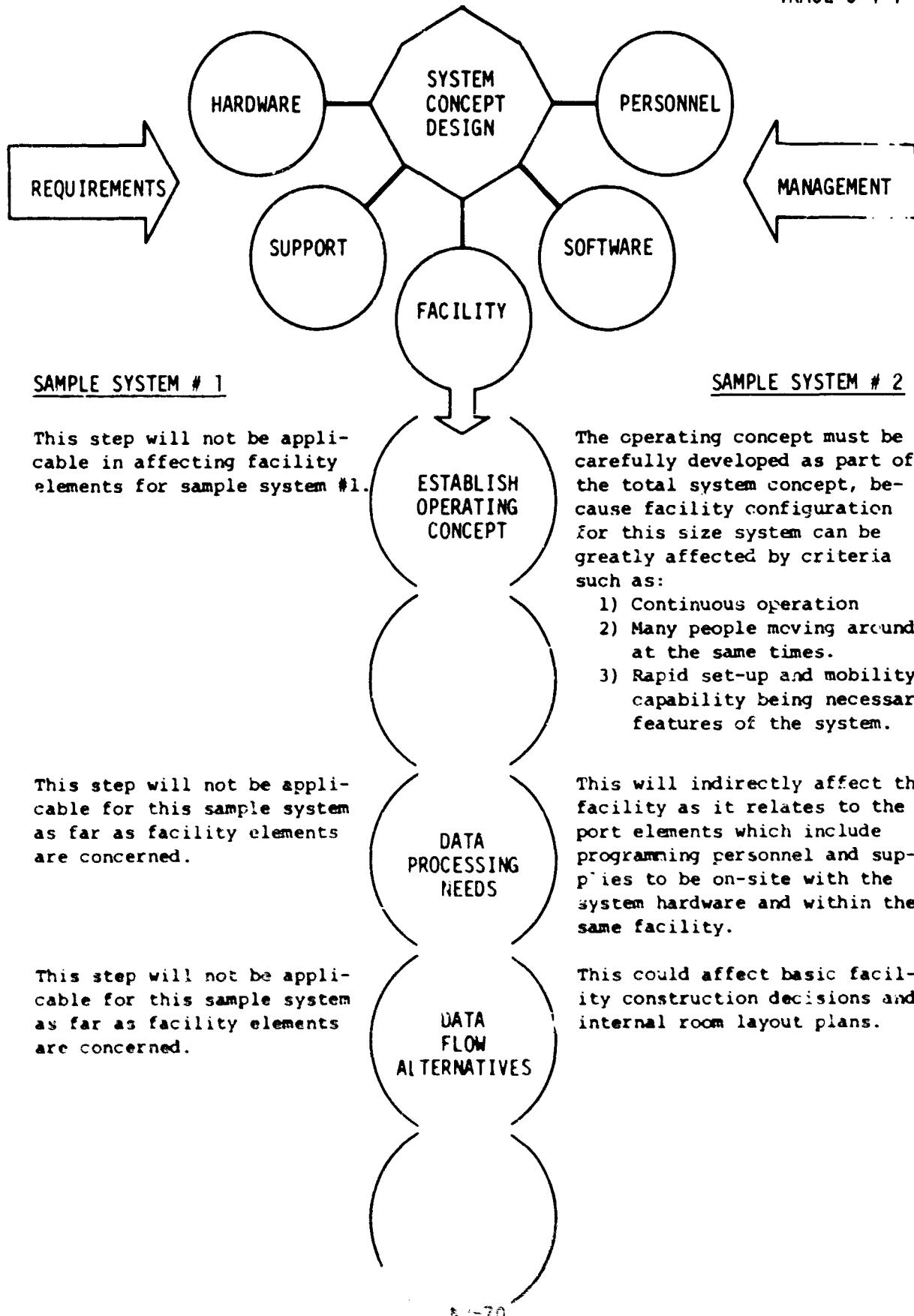
This is directly applicable to validate the software element specifications to be developed in the next task.

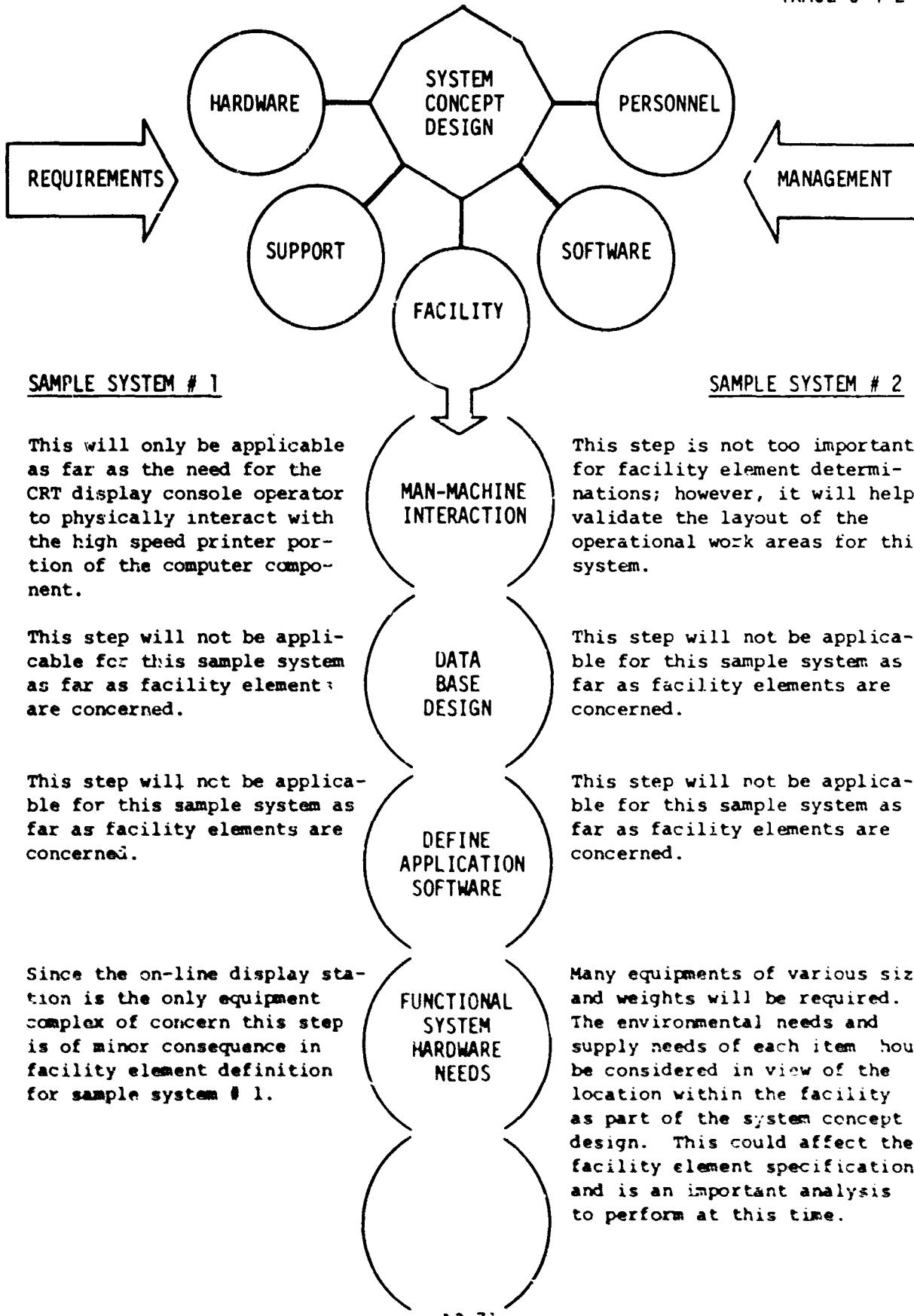
Many hardware stations will be included in this system such as digital plotters and automated photographic image measuring sub-systems. These equipment needs relative to the computer component(s) should be defined here prior to deciding on all the application program needs.

This system will involve a very complex scenario and work must be started on it at this point. Files will have to be created for baseline exercises, and the software needs will have to be identified which will assist in the creation and use of the initial data base. This initial data base will reflect the scenario.

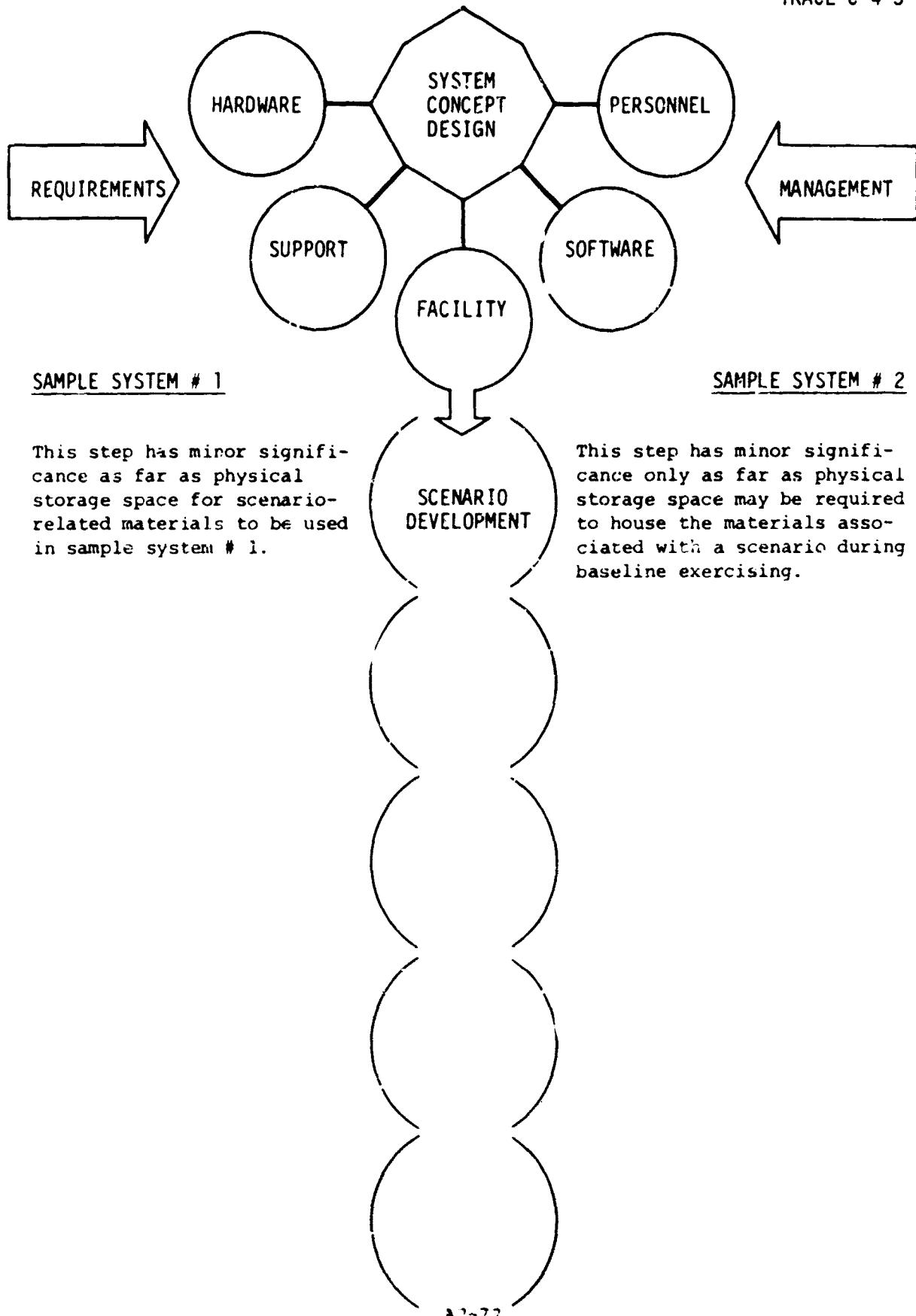


TRACE C-4-1

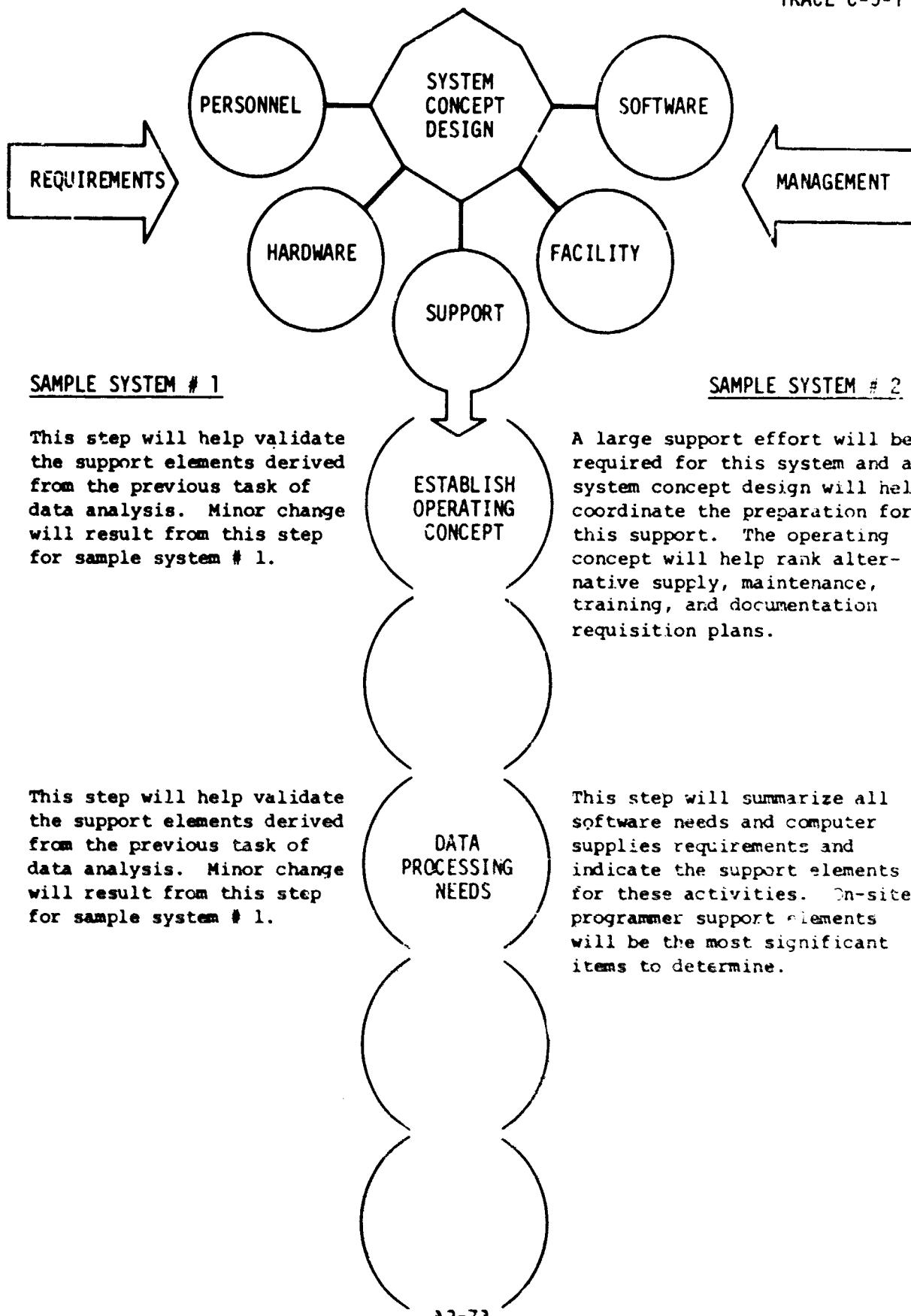


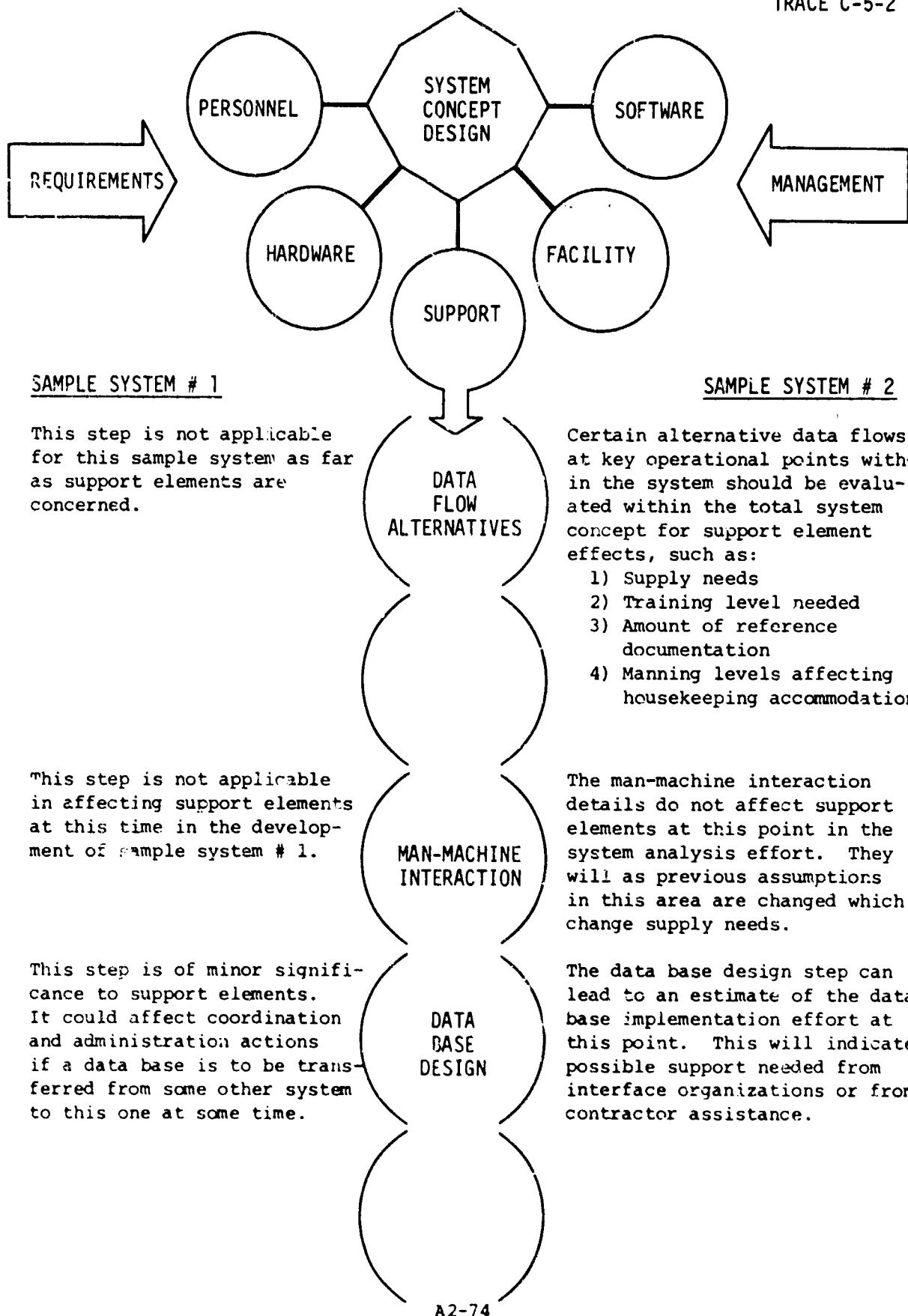


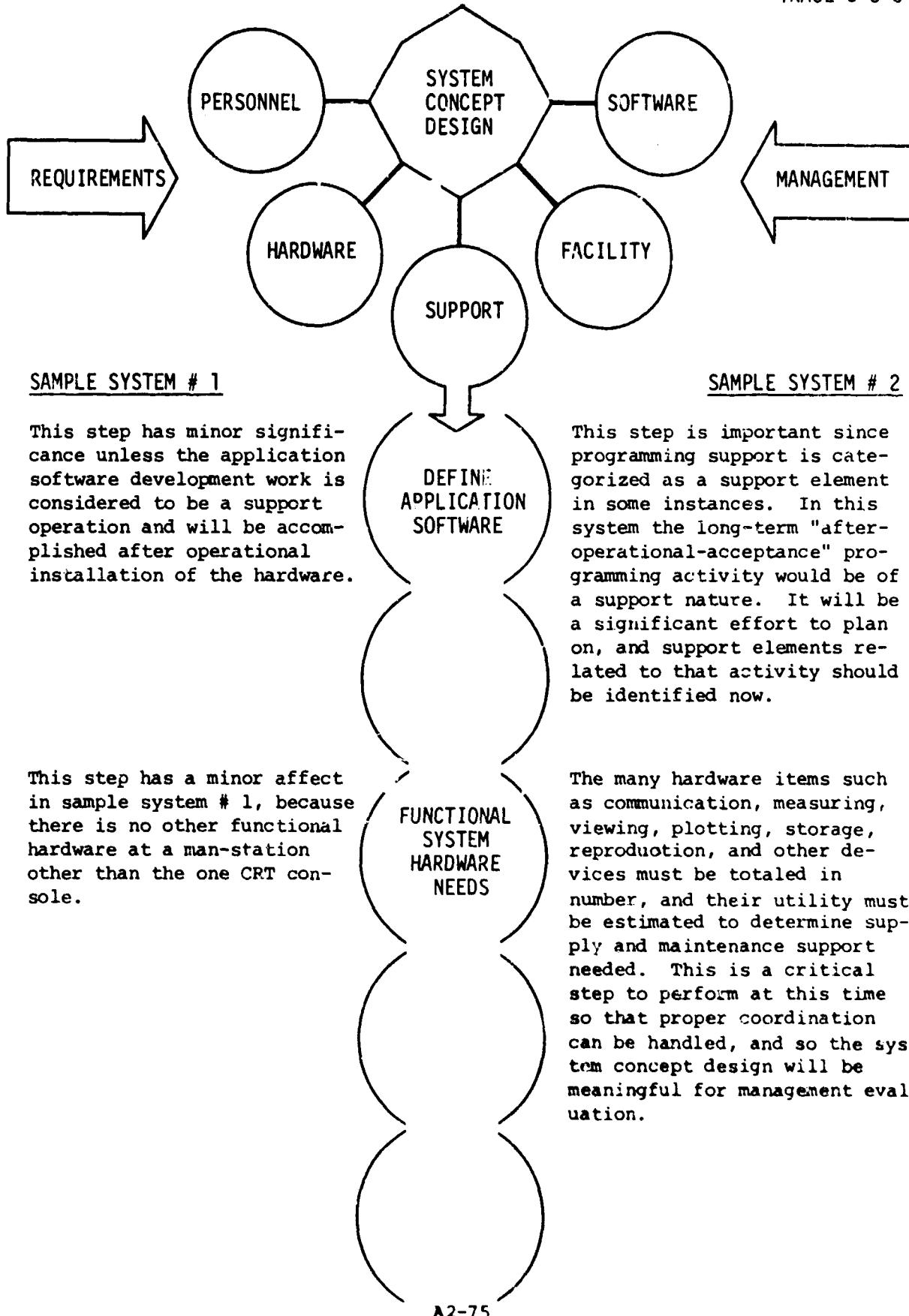
TRACE C-4-3

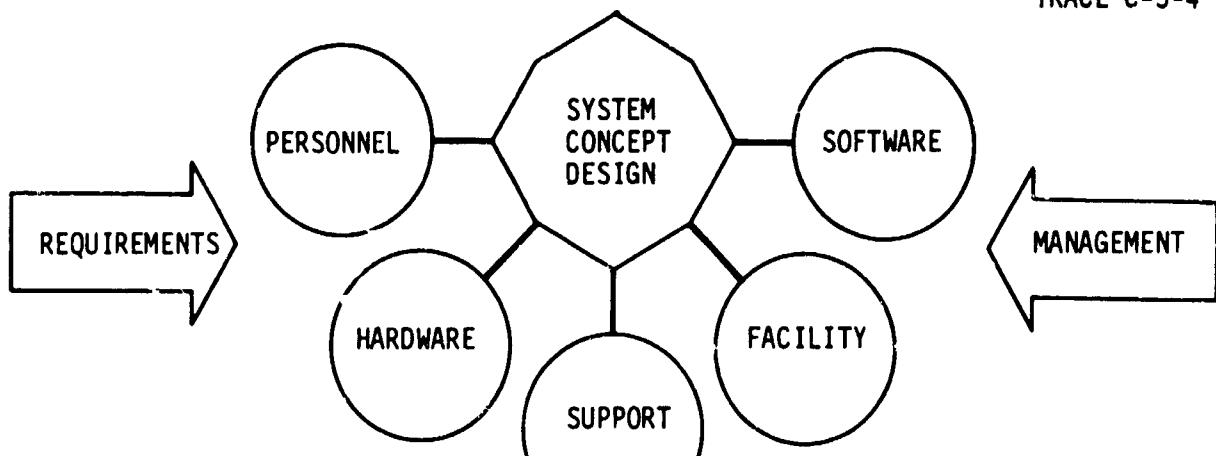


TRACE C-5-1





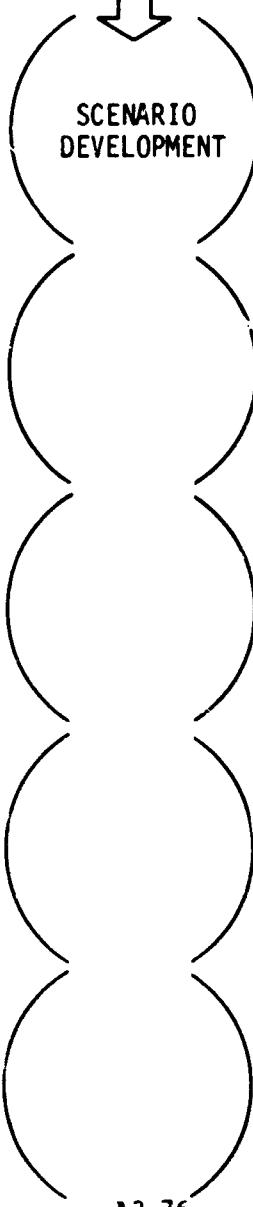


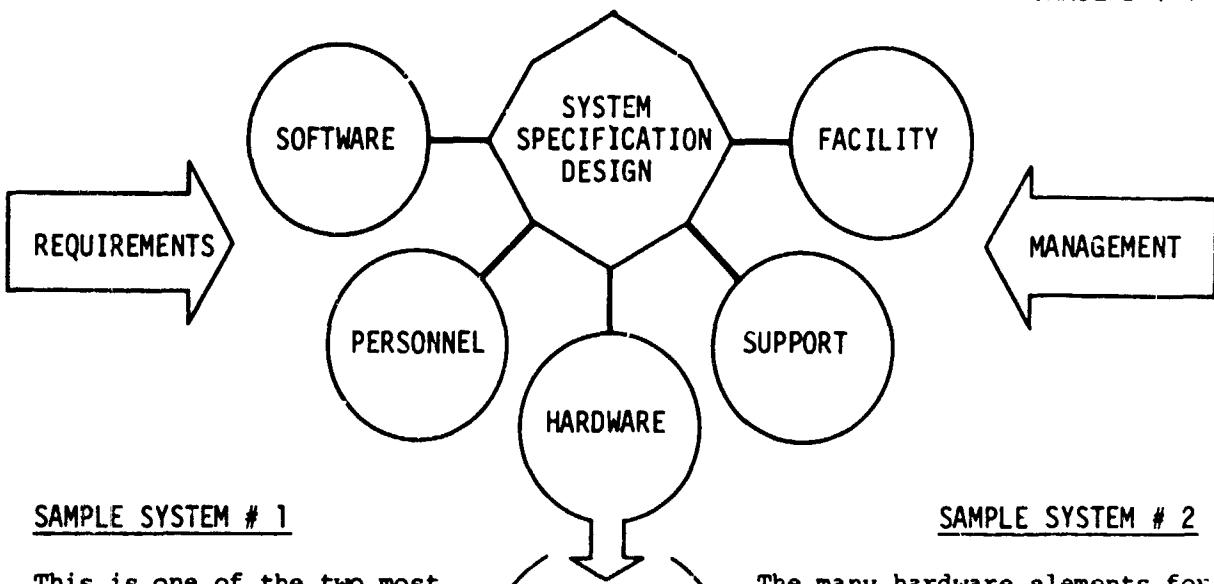
SAMPLE SYSTEM # 1

This step has an effect on support elements if an outside group must produce the scenario materials in support of the system concept. For this sample system it is not a major item of importance since the scenario is small and only consists of a set of files.

SAMPLE SYSTEM # 2

The scenario development will affect the need for support if an outside group or a large group is involved in the preparation and later exercising of the scenario. In this case, this will require a great amount of support activity. This point should be highlighted at this time, because of the need to start this activity early, prior to baseline exercising.



SAMPLE SYSTEM # 1

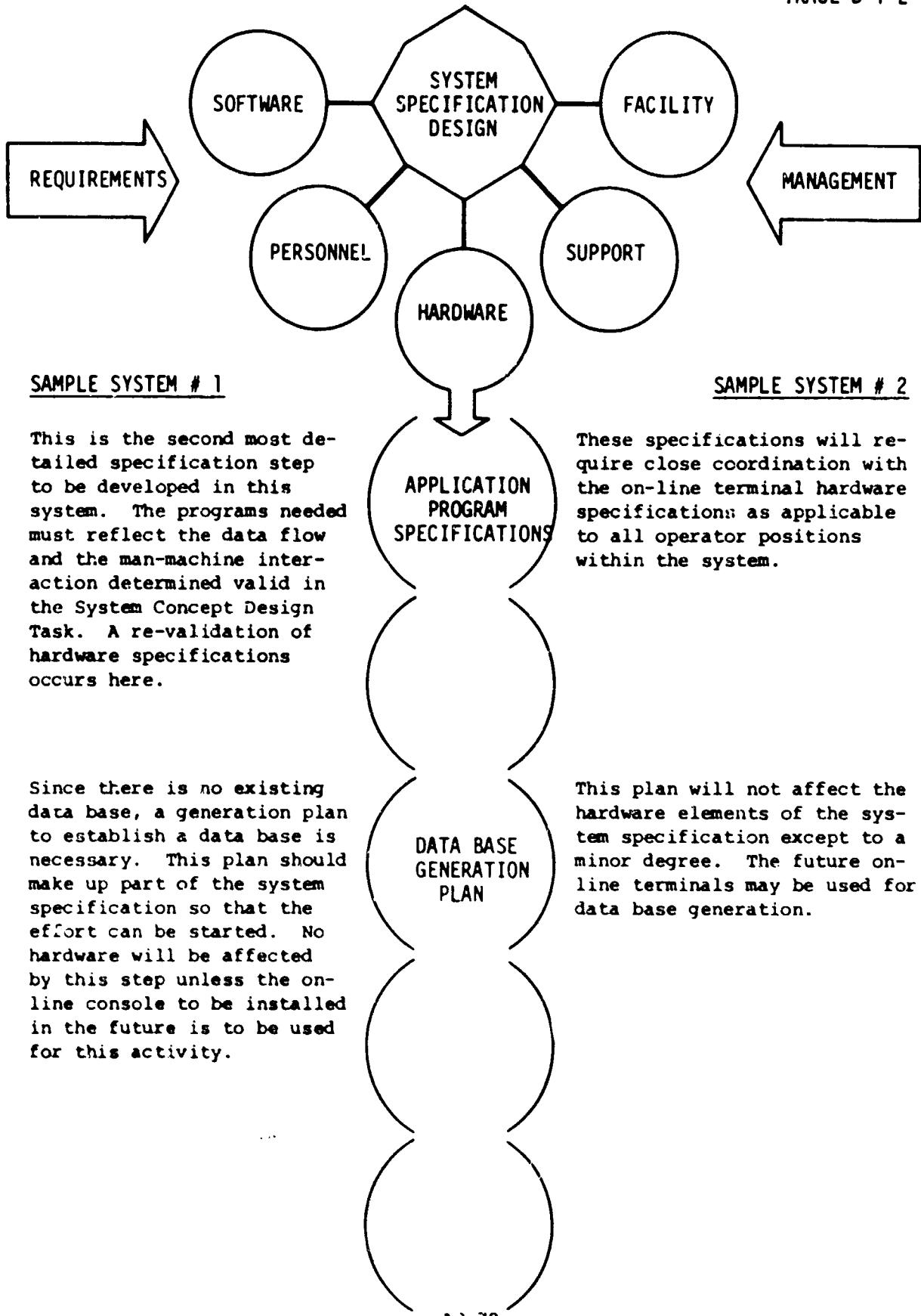
This is one of the two most detailed steps in this sample system. The on-line console must be specified for procurement at this point. Its performance and physical characteristics should be described as a part of the system specification design.

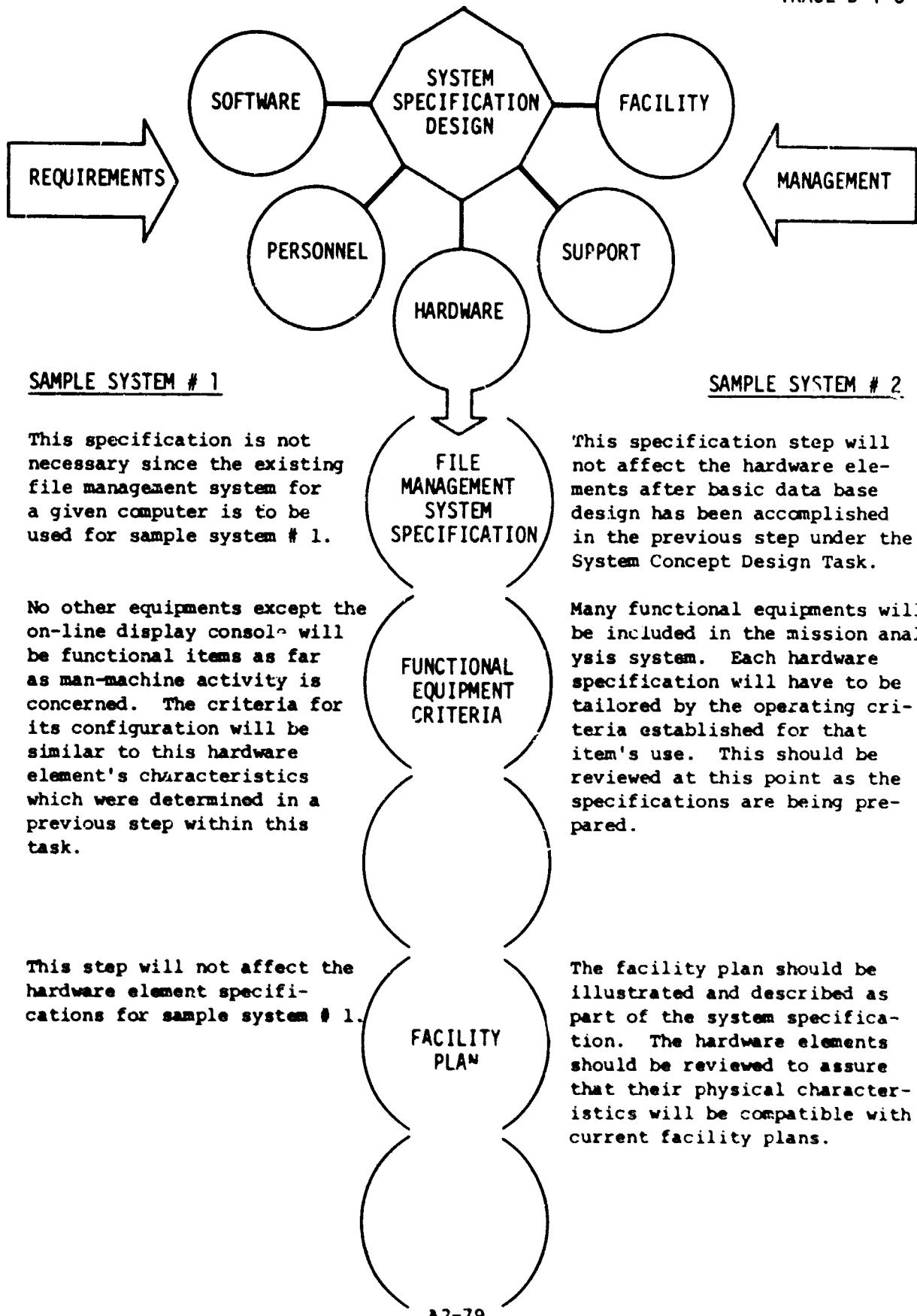
SAMPLE SYSTEM # 2

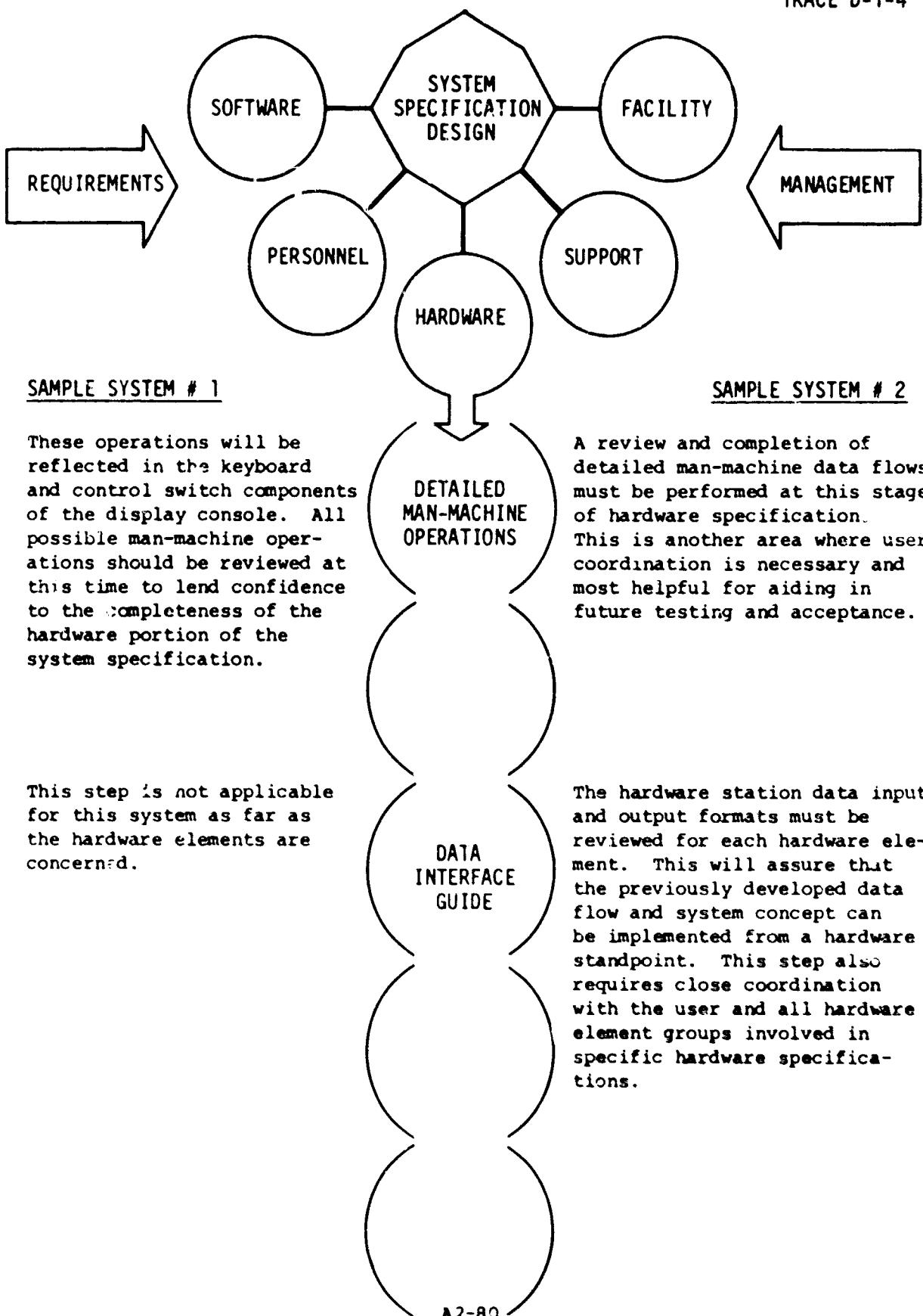
The many hardware elements for this system must be organized by functional area and specified for procurement and for development at this point. The performance and physical characteristics of each item should be documented for acquisition purposes. This is normally a large, time-consuming step for a system such as this. It is important to have experienced engineering personnel involved in the preparation of these specifications.

This will not be applicable for this sample system since it is assumed that an existing computer and its system software is directed for use. Hardware elements connected with this system are not affected by this step.

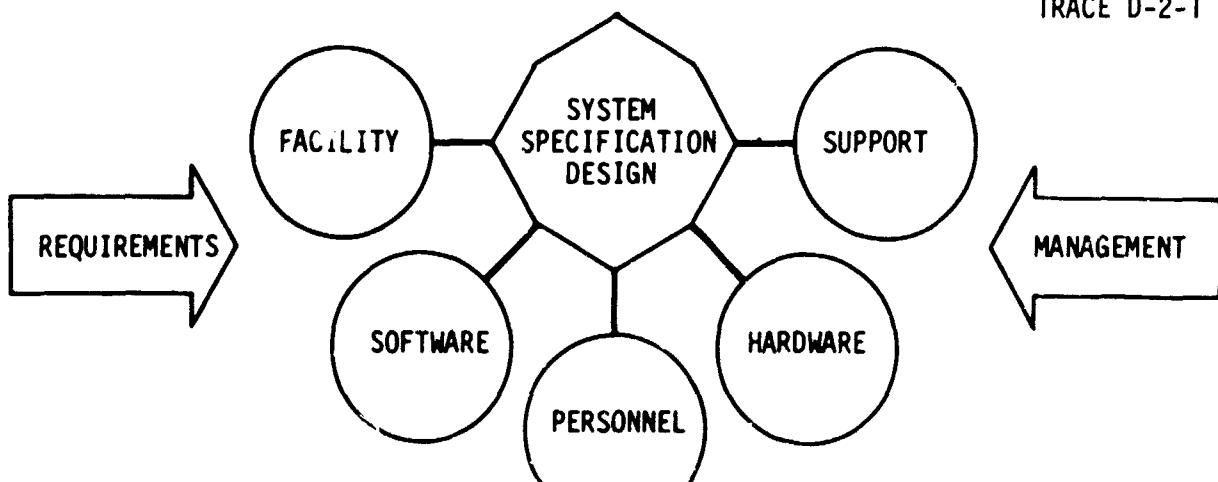
The specifications for system software will affect the data processing mass storage and computer memory size requirements. It will also affect the message switching hardware-buffer aspects if the data processing concept contains many remote, on-line terminals.







TRACE D-2-1



SAMPLE SYSTEM # 1

This step will not affect the personnel plans significantly in sample system # 1.

This step will not affect the personnel elements for this sample system specification.

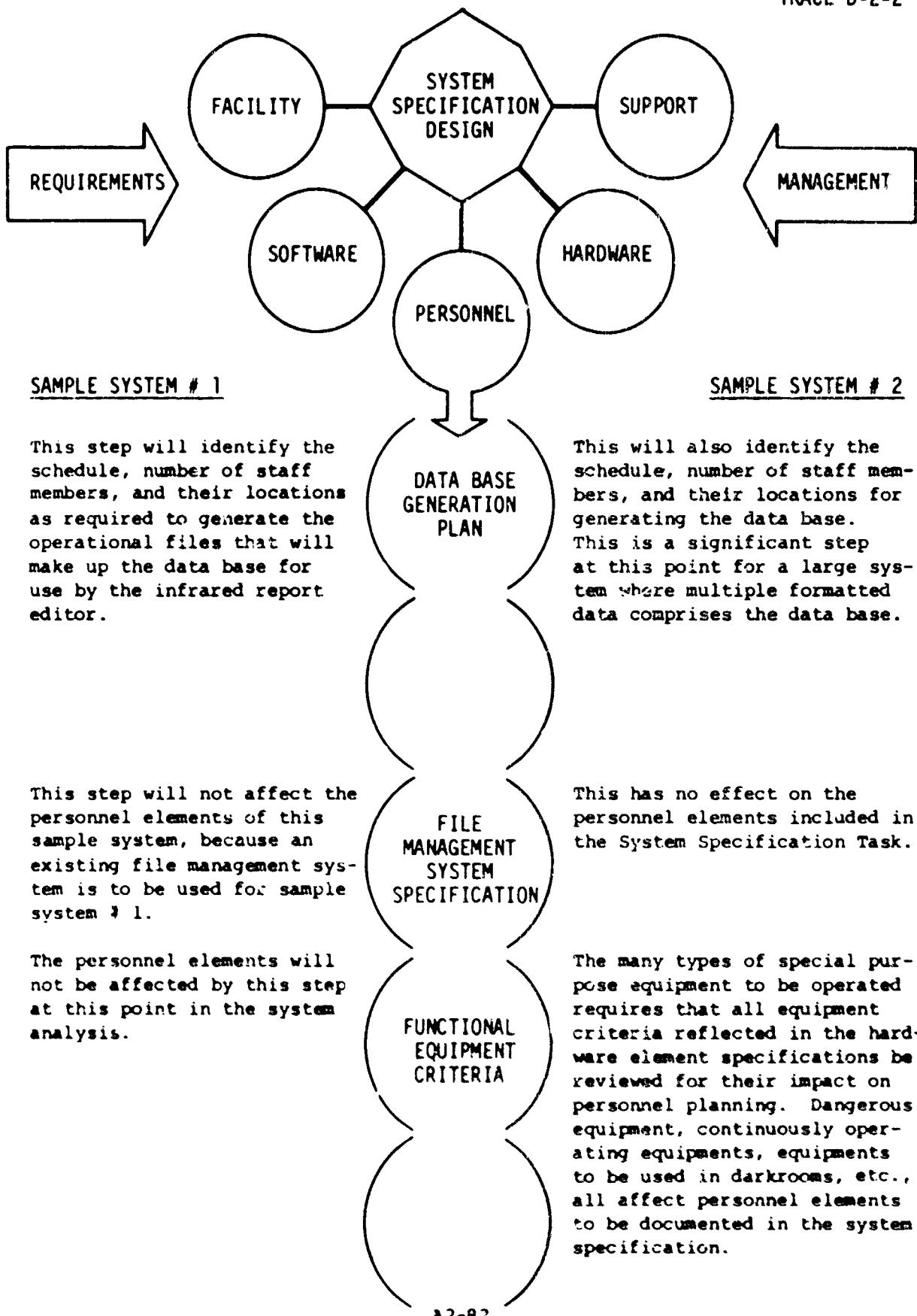
This step will not affect the personnel elements for this sample system specification.

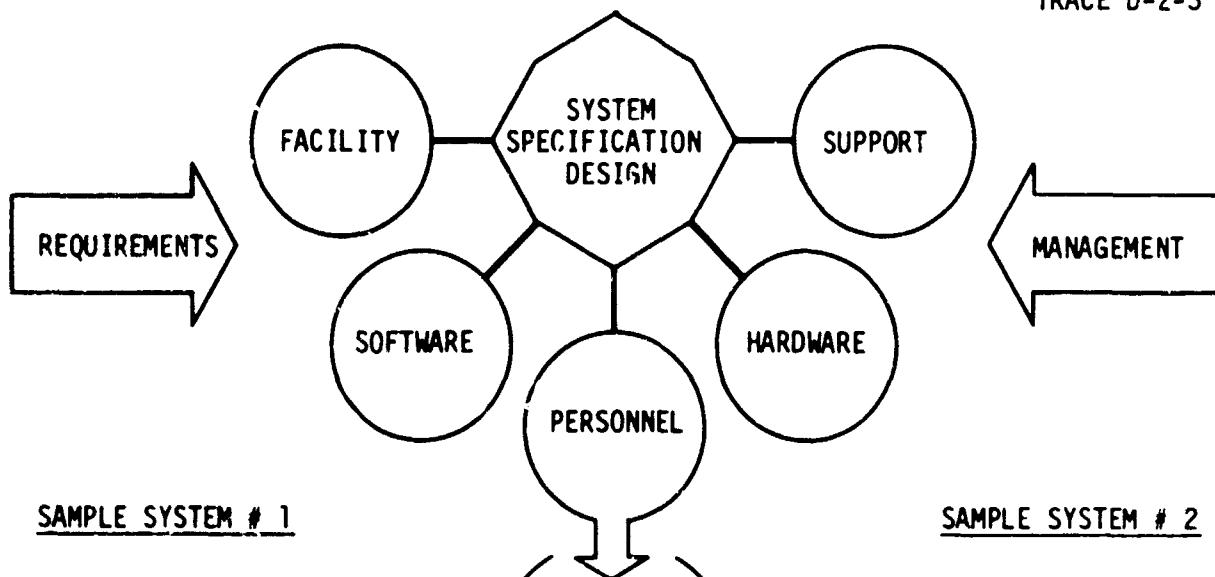
SAMPLE SYSTEM # 2

This step will not affect the personnel specification elements except to help validate critical training requirements previously identified.

This will not affect the personnel elements at this point in the system analysis effort.

This will not affect the personnel acquisition planning directly; however, as the application programming language is defined at this point, it should be reflected in personnel training plans. These items are considered as support elements in this sample system.



SAMPLE SYSTEM # 1

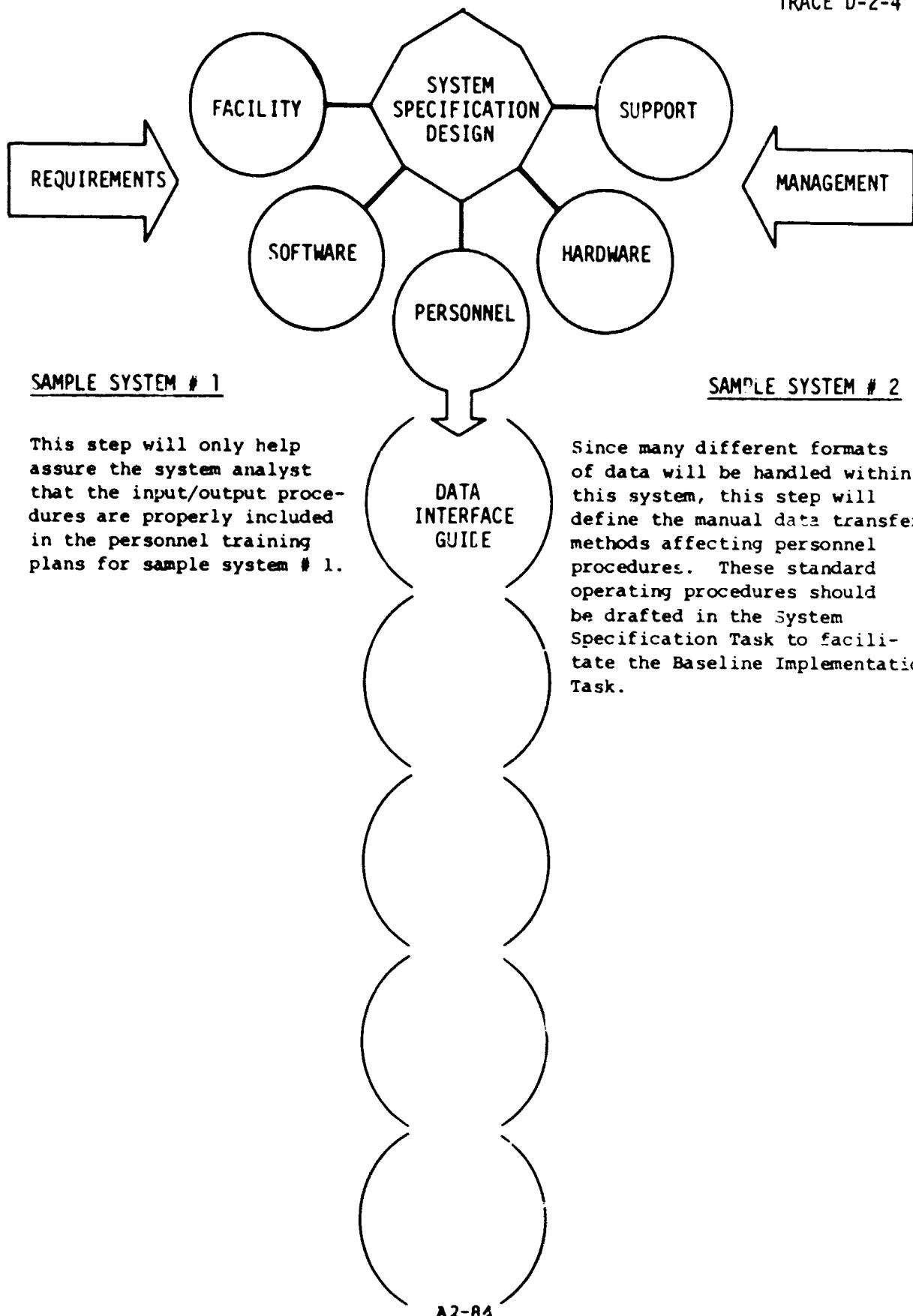
This will validate the proposed work area and location so that administrative procedures that affect the system operators can be developed, i.e., future demonstrations, personnel communication accommodations, etc.

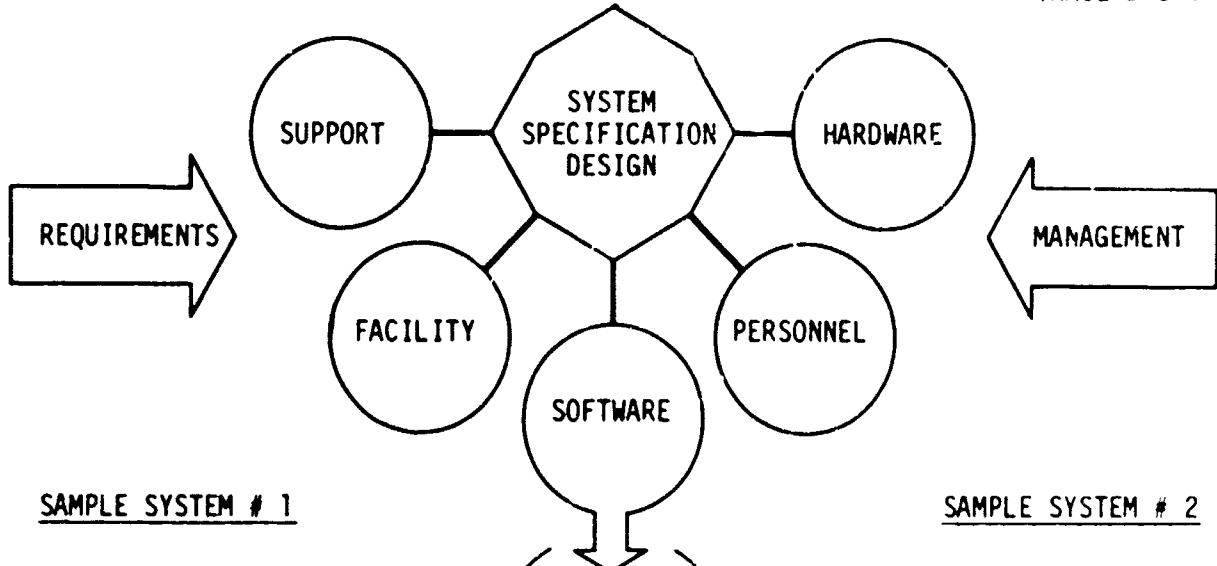
SAMPLE SYSTEM # 2

This step will validate that working space has been properly allocated for the man-machine station configurations and it is important to have this data at this time. Coordination with the user is helpful here.

This step will re-confirm the training needed and any special reference data required by the operator at the CRT display console station. It will not impact on the personnel elements portion of the system specifications to any great degree.

This will re-confirm the training and numbers of personnel needed throughout the system. This is the final check on detailed manning requests to be included in the system specification.



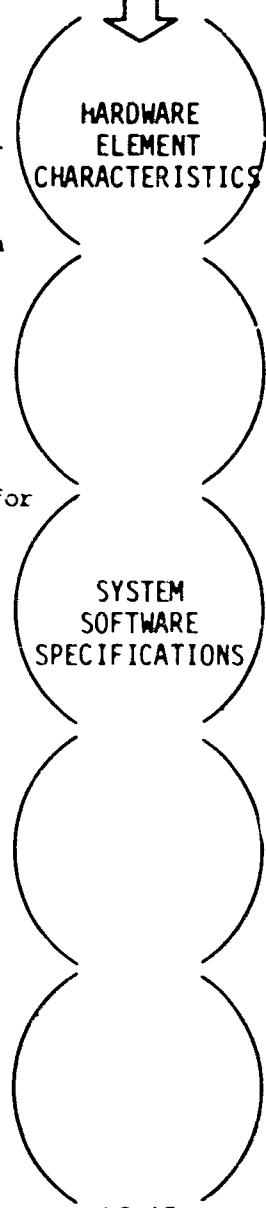
SAMPLE SYSTEM # 1

This step will affect the software elements to the extent that the characteristics of the console electronics are completely specified. This will determine the bit configuration for application programming specifications.

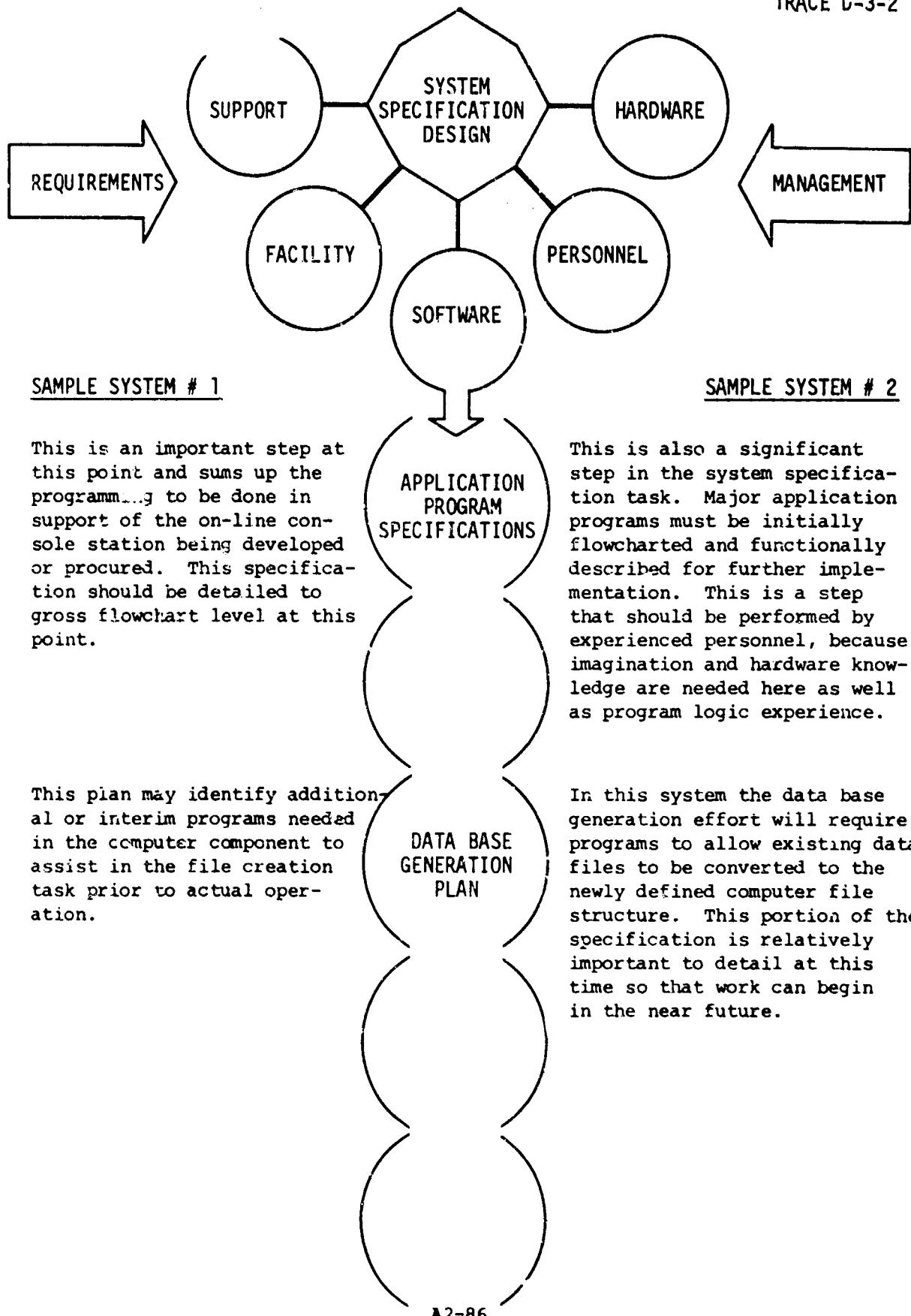
SAMPLE SYSTEM # 2

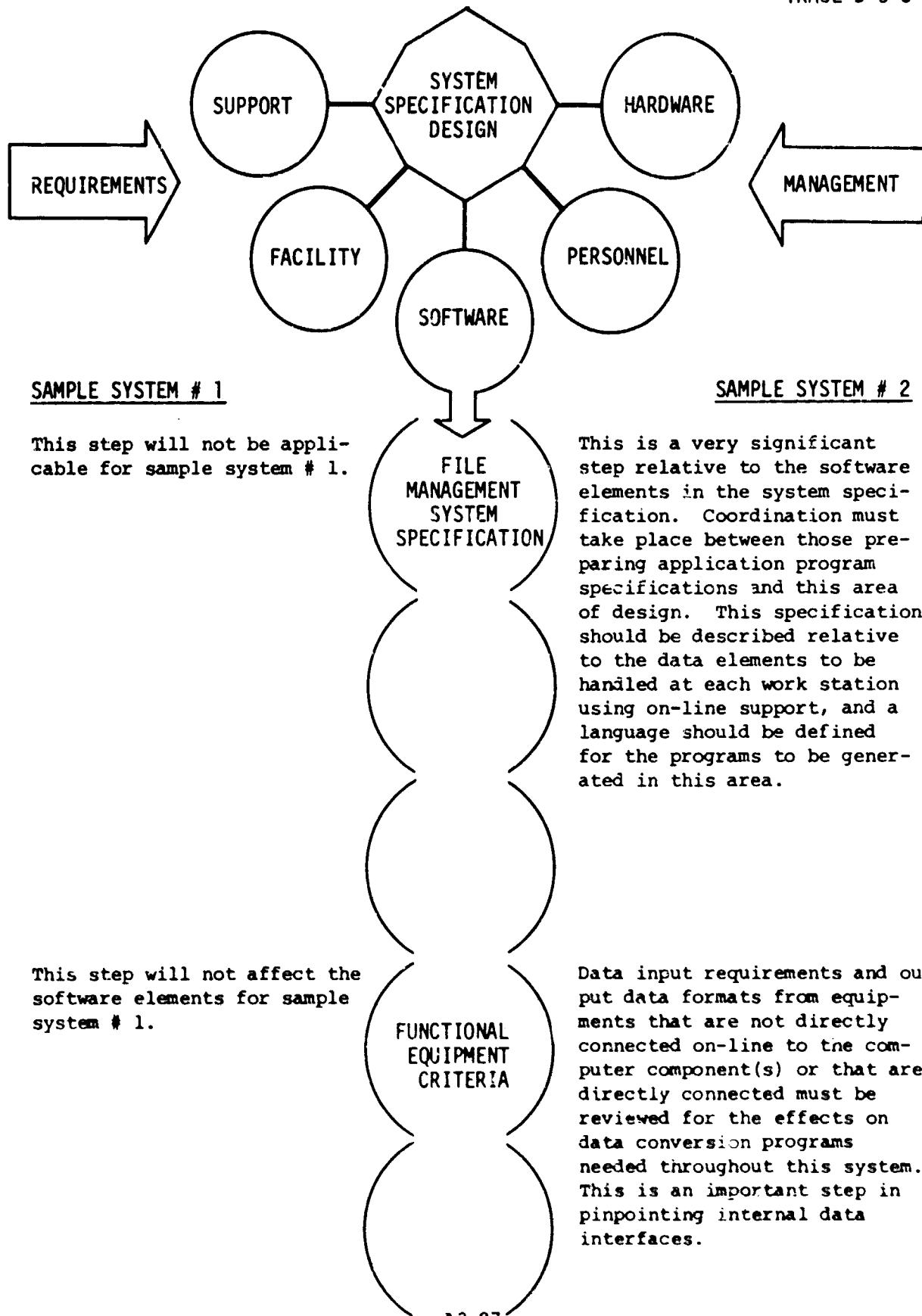
All hardware logic will affect the software interfaces between peripheral equipments and the data processing component(s) used. This will be an important step to complete prior to drafting the software portion of the system specifications.

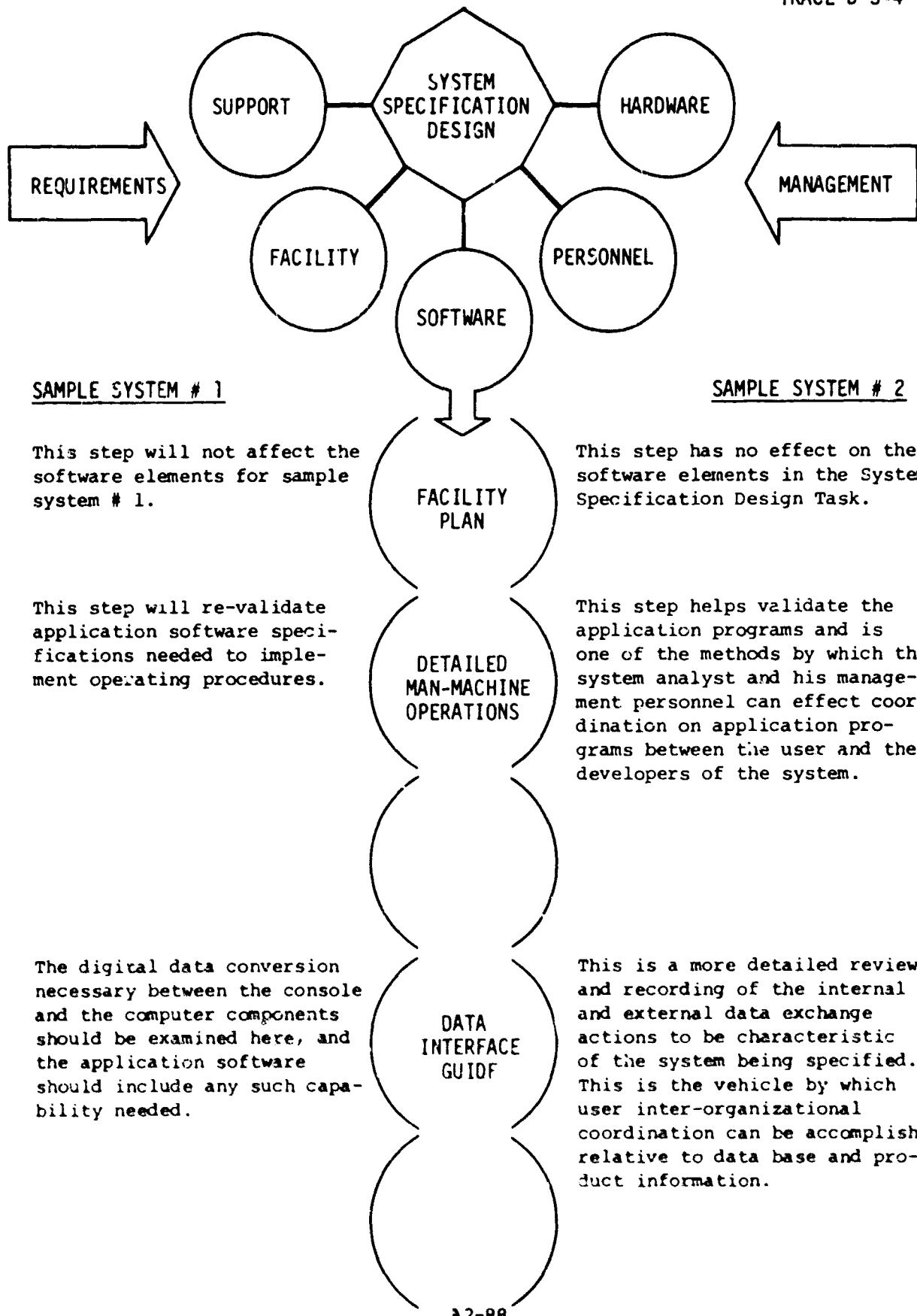
This step is not applicable for sample system # 1.

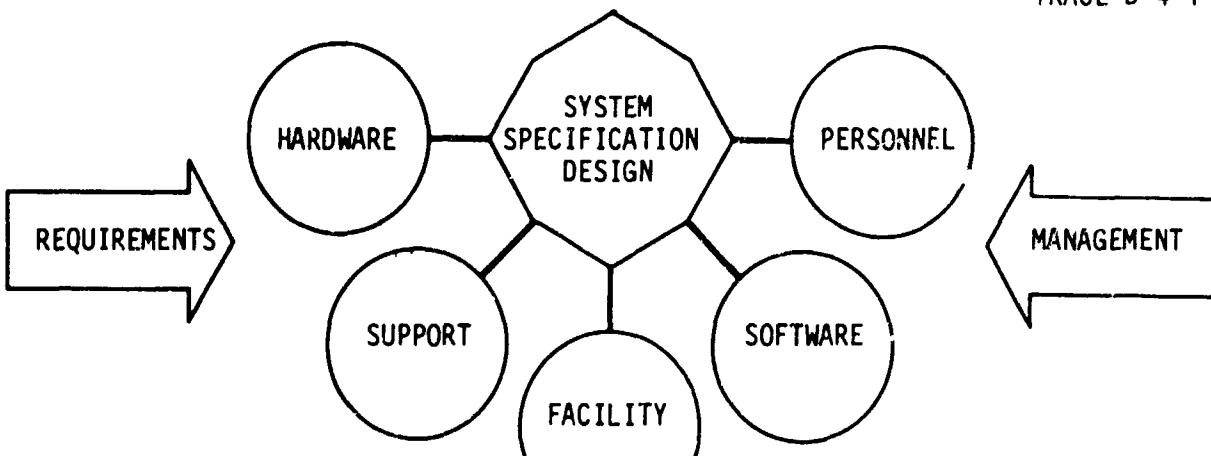


This is a significant step for this system and is a major portion of the software portion of the system specification. Executive, utility, standard conversion, display library handlers, diagnostic, and system initiation programs must be defined and flowcharted at this time.







SAMPLE SYSTEM # 1

This step is not applicable as far as facility elements are concerned for sample system # 1.

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SAMPLE SYSTEM # 2

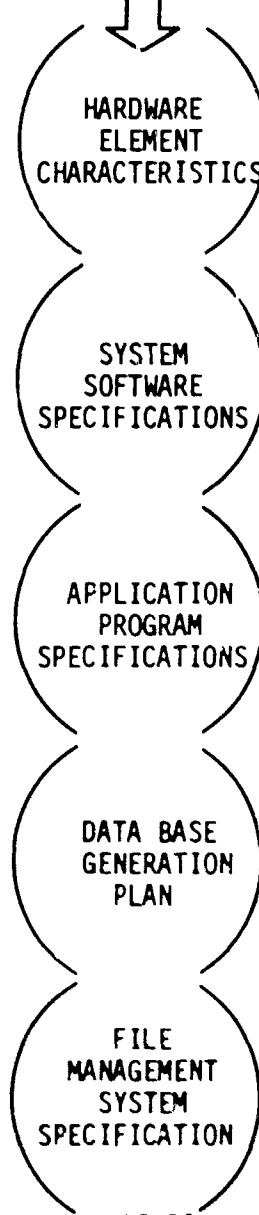
This step is not applicable as far as facility elements are concerned for sample system # 2.

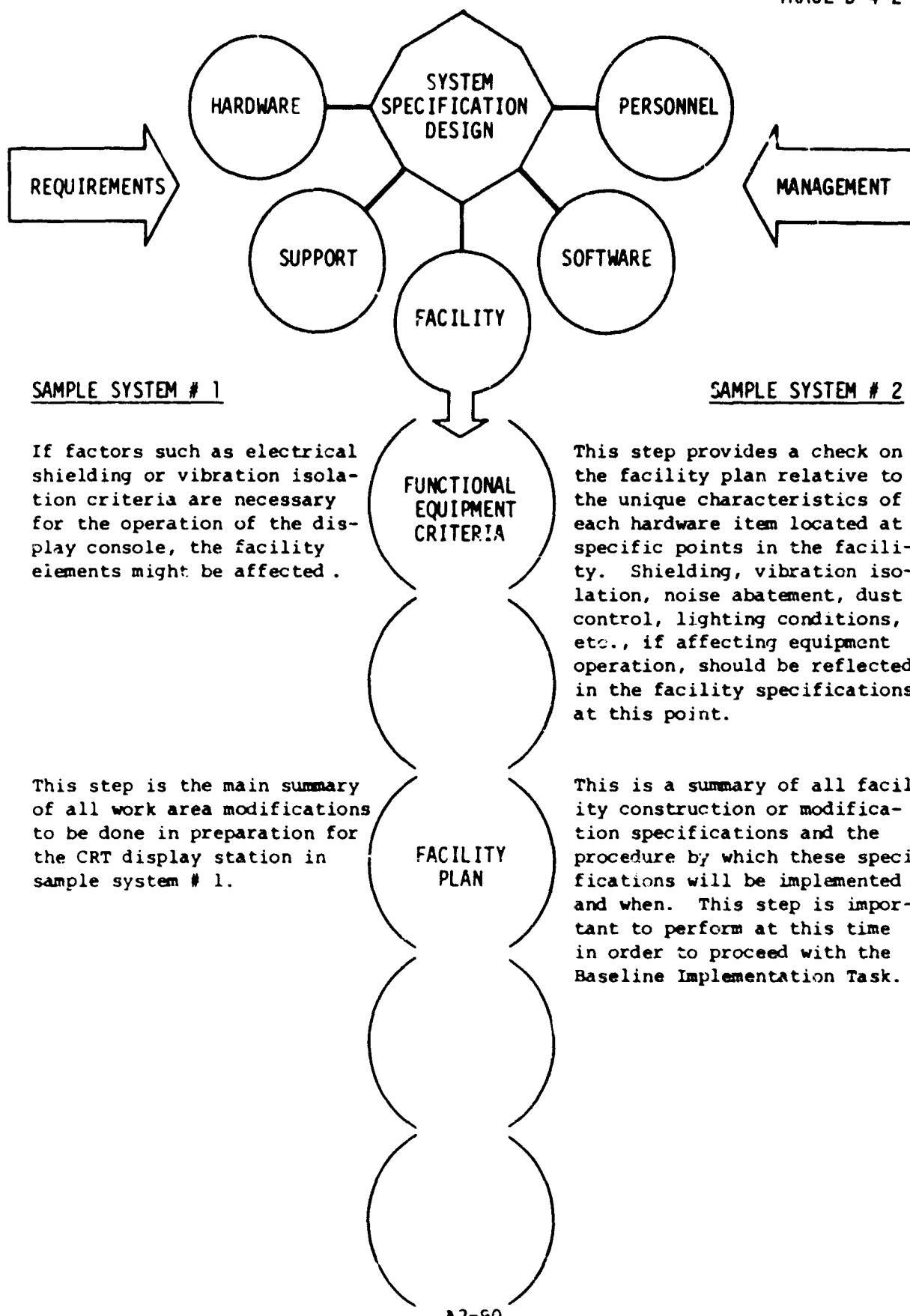
This step is not applicable as far as facility elements are concerned for sample system # 2.

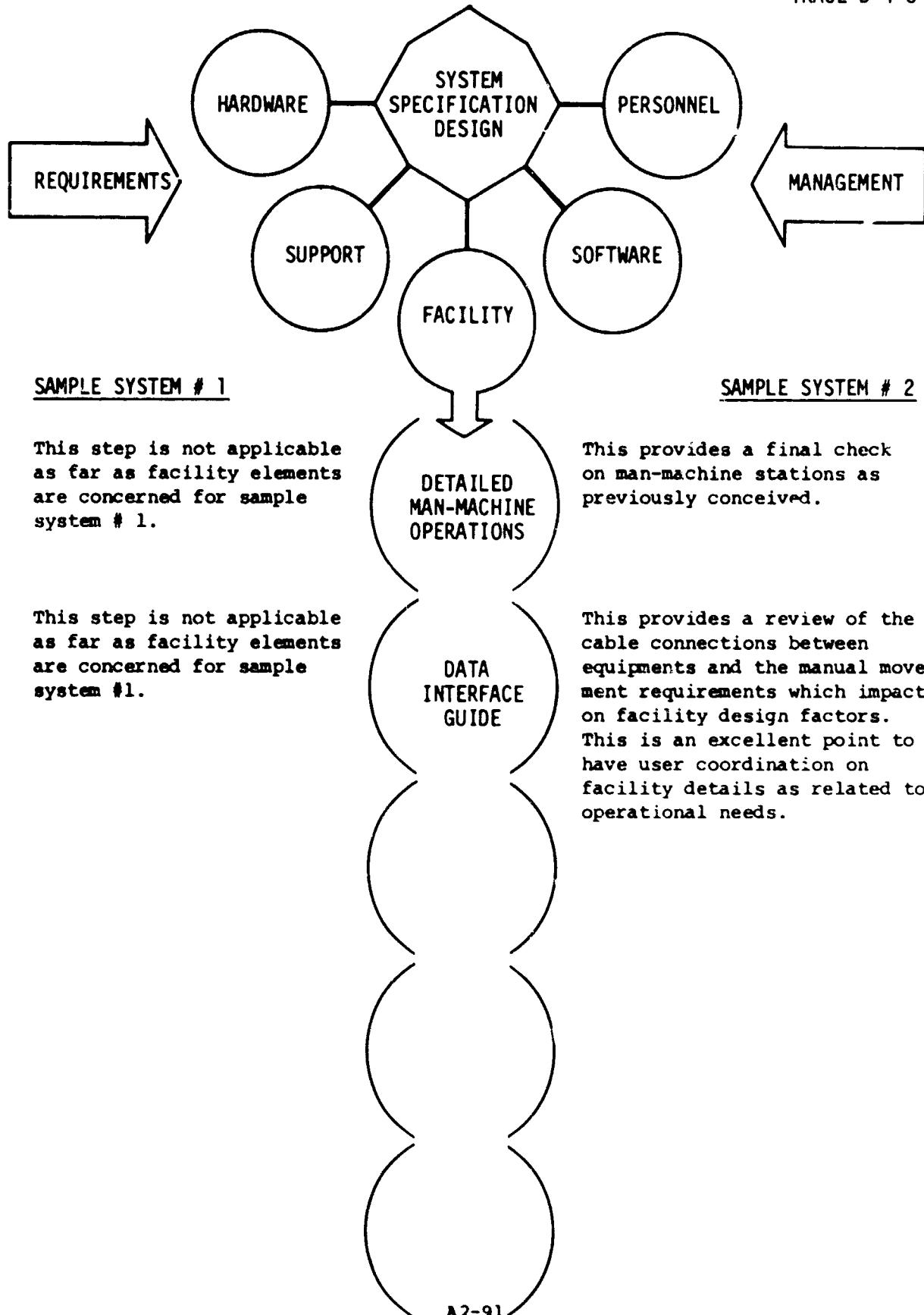
This step is not applicable as far as facility elements are concerned for sample system # 2.

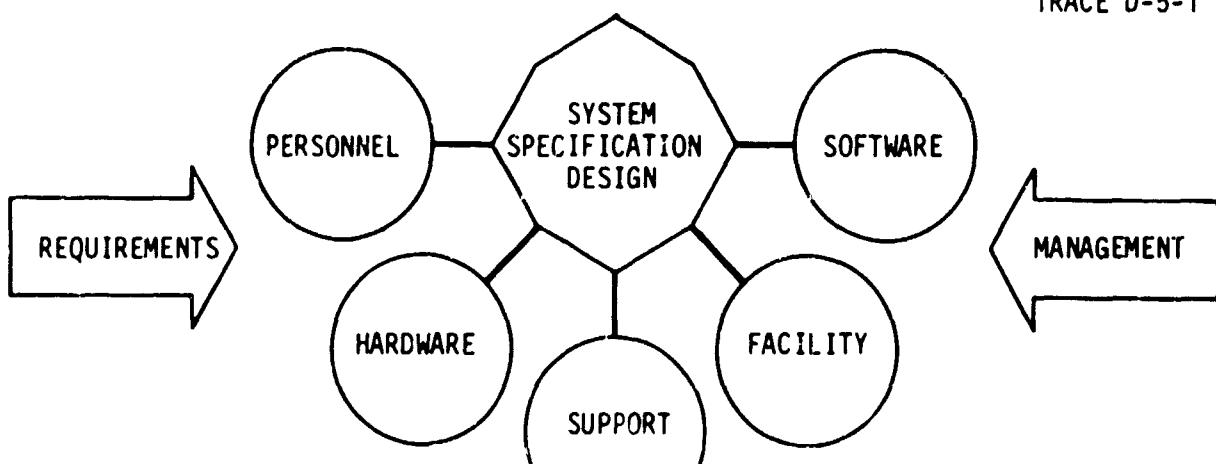
This step is not applicable as far as facility elements are concerned for sample system # 2.

This step is not applicable as far as facility elements are concerned for sample system # 2.







SAMPLE SYSTEM # 1

Spare parts, supply needs, and maintenance support are identified for the CRT display console and reflected in the procurement specifications.

This step is not applicable for sample system # 1.

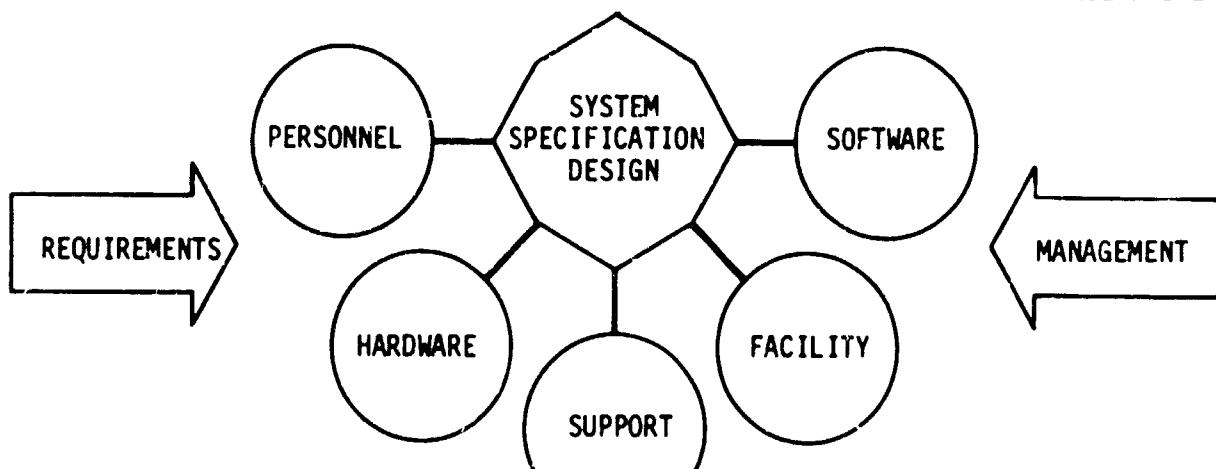
Supplies, supplemental programming aids, and reference documentation may be needed for the application programmer, and this can be derived by examining the specifications for the application programs to be developed.

HARDWARE ELEMENT CHARACTERISTICSSYSTEM SOFTWARE SPECIFICATIONSAPPLICATION PROGRAM SPECIFICATIONS

The different hardware items in this system must be reviewed at this point so that spare parts, supplies, maintenance, and support documentation can be specified for each hardware element.

Supplies and the necessary housekeeping needs for the staff and length of time planned for producing all system software in-house should be specified. If it is to be contracted out, then the direct support needed to be provided may be reduced dependent on the location selected for this activity.

Supplies and the necessary housekeeping needs for the staff and length of time planned for producing all system software in-house should be specified. If it is to be contracted out, then the direct support needed to be provided may be reduced dependent on the location selected for this activity.

SAMPLE SYSTEM # 1

Any temporary space or supply elements required while generating the data base can be derived at this time and specified in the support area of the system specification.

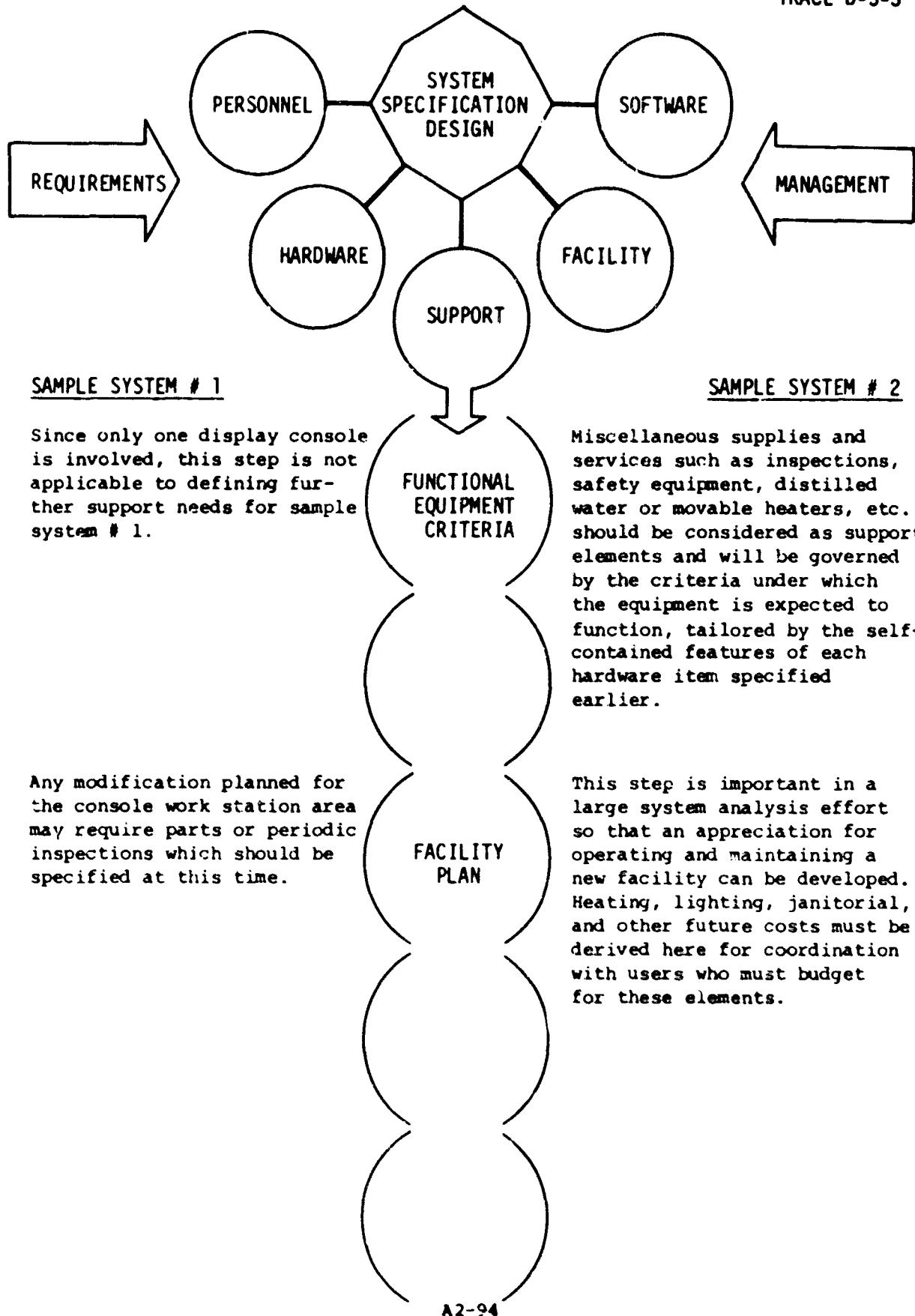
SAMPLE SYSTEM # 2

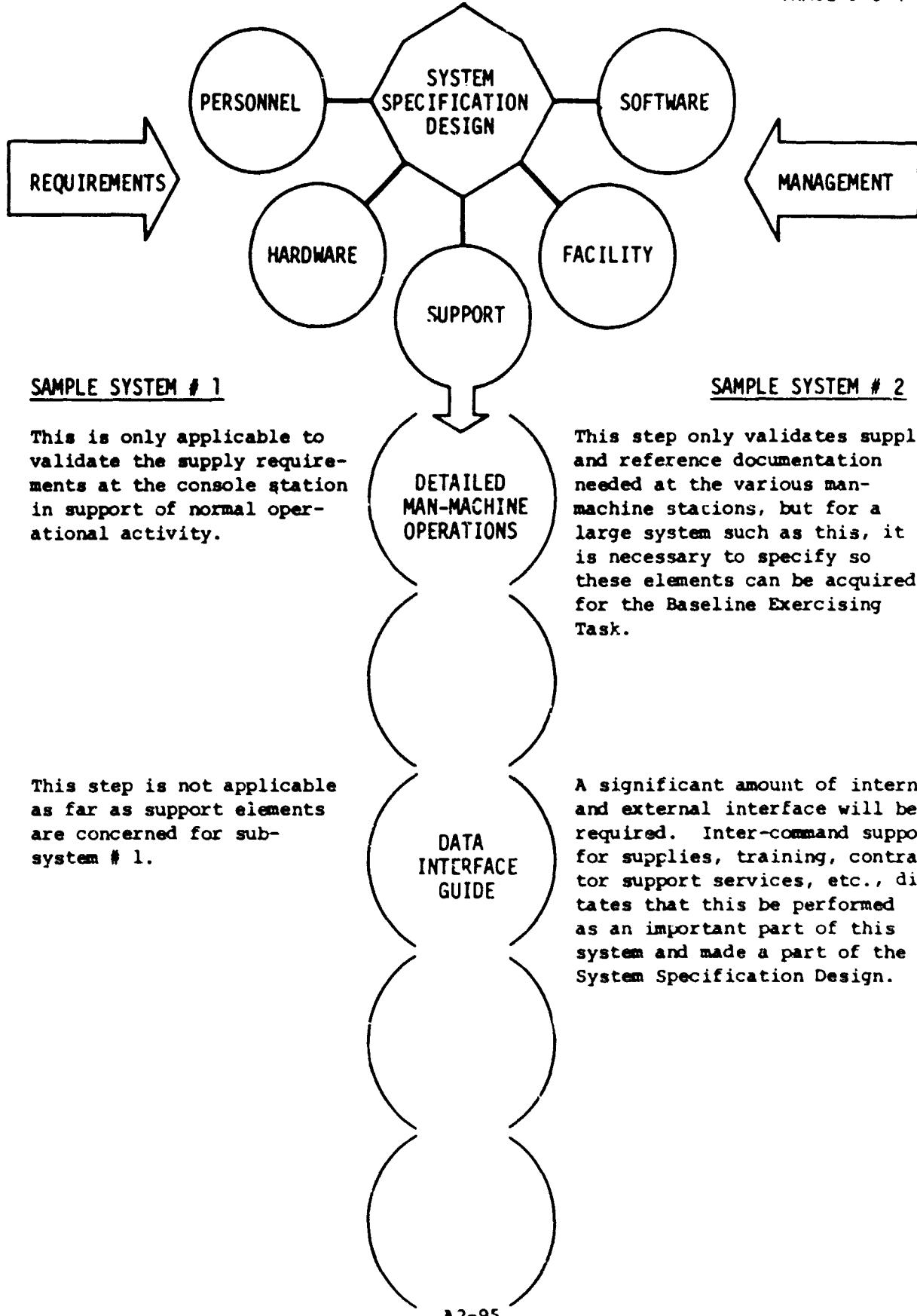
Supplies and the necessary housekeeping needs for the staff and length of time planned for producing all system software in-house should be specified. If it is to be contracted out, then the direct support needed to be provided may be reduced dependent on the location selected for this activity.

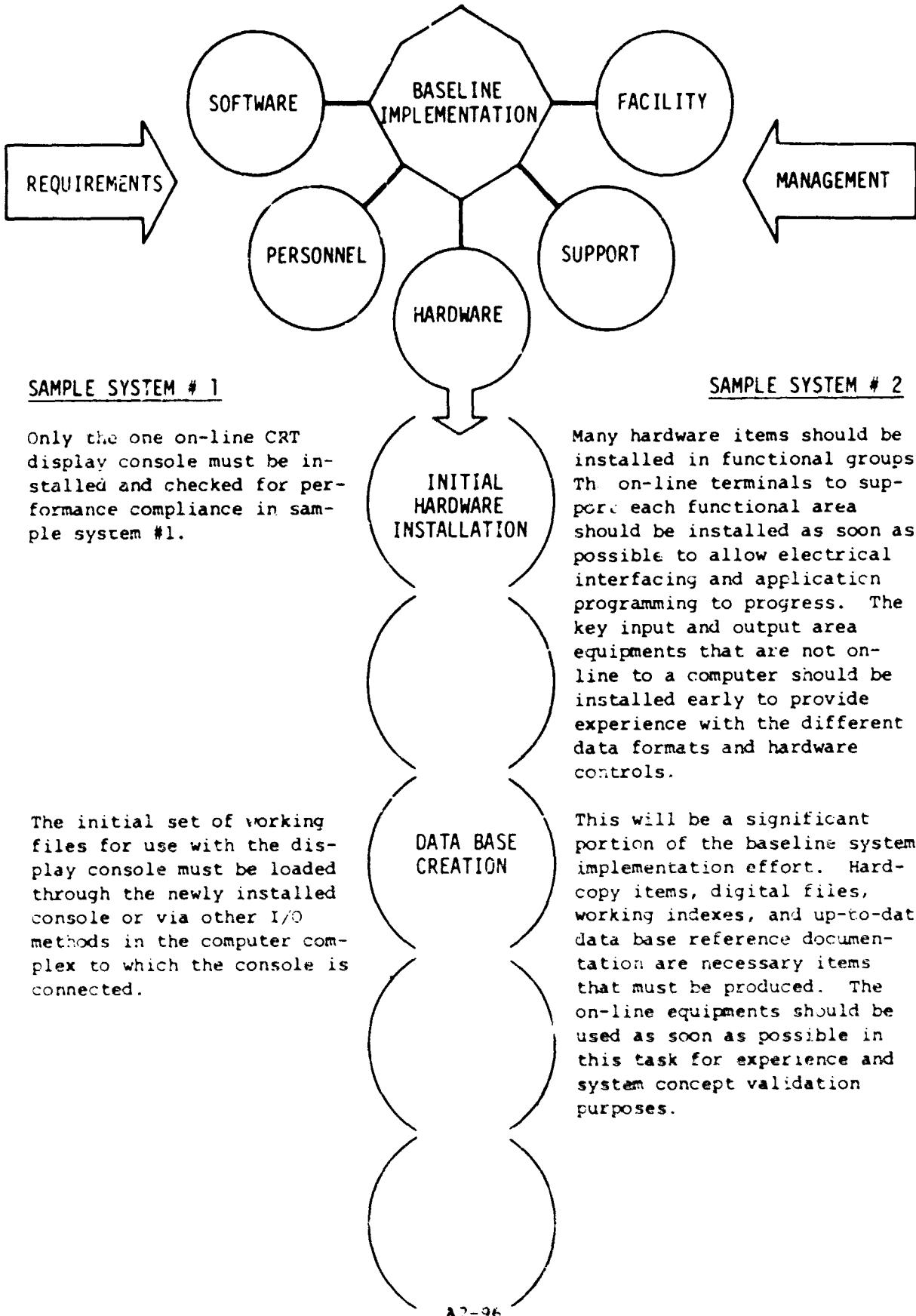
This step is not applicable for sample system # 1.

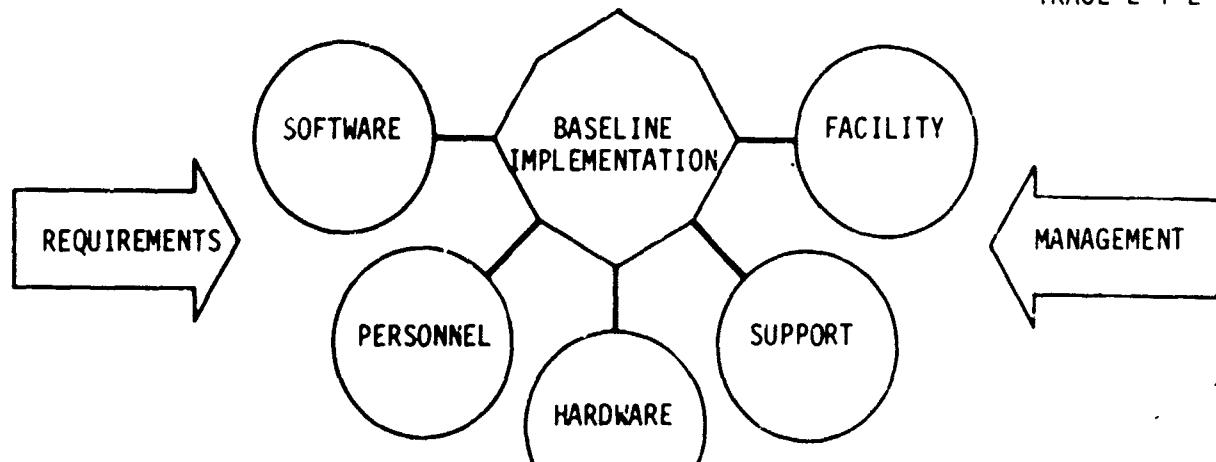


Supplies and the necessary housekeeping needs for the staff and length of time planned for producing all system software in-house should be specified. If it is to be contracted out, then the direct support needed to be provided may be reduced dependent on the location selected for this activity.







SAMPLE SYSTEM # 1

This step is not applicable for sample system #1.

SAMPLE SYSTEM # 2

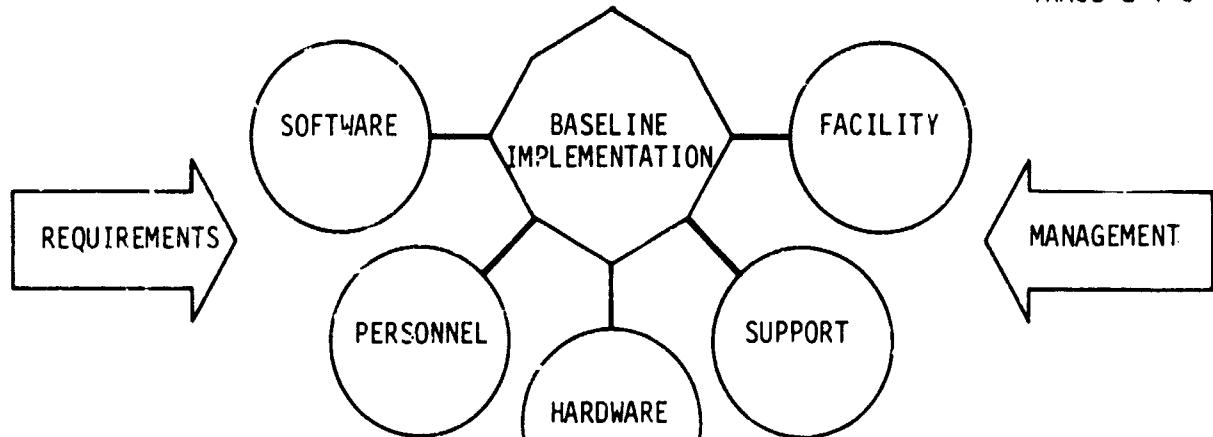
This step has a relationship to the availability of data processing equipment. If the system's hardware is not going to be available right after the System Specification Design Task, then a similar EDP system can sometimes be used (usually at more expense and with data security limitations) to save time.

This step will require use of the new console for program checkout as soon as possible after the application programs are coded and loaded into the computer complex.

These procedures must be prepared so as to exercise all the performance features specified in the hardware specifications as listed in reports describing earlier man-machine interaction.

The data processing hardware configuration along with exact copies of the terminal equipments must be available to the programmers for this activity to be efficiently accomplished.

All hardware must be exercised against a pre-planned test to assure their compliance to specifications. Many of the detailed man-machine test procedures should be developed after the hardware is installed in this type of system. Close coordination during equipment design and fabrication can provide a base for this step, but as a rule much must be done after actual installation.

SAMPLE SYSTEM # 1

This will be a minor step for sample system #1 since on-the-job training will be relatively minor. No hardware elements will be affected in this case.

SAMPLE SYSTEM # 2

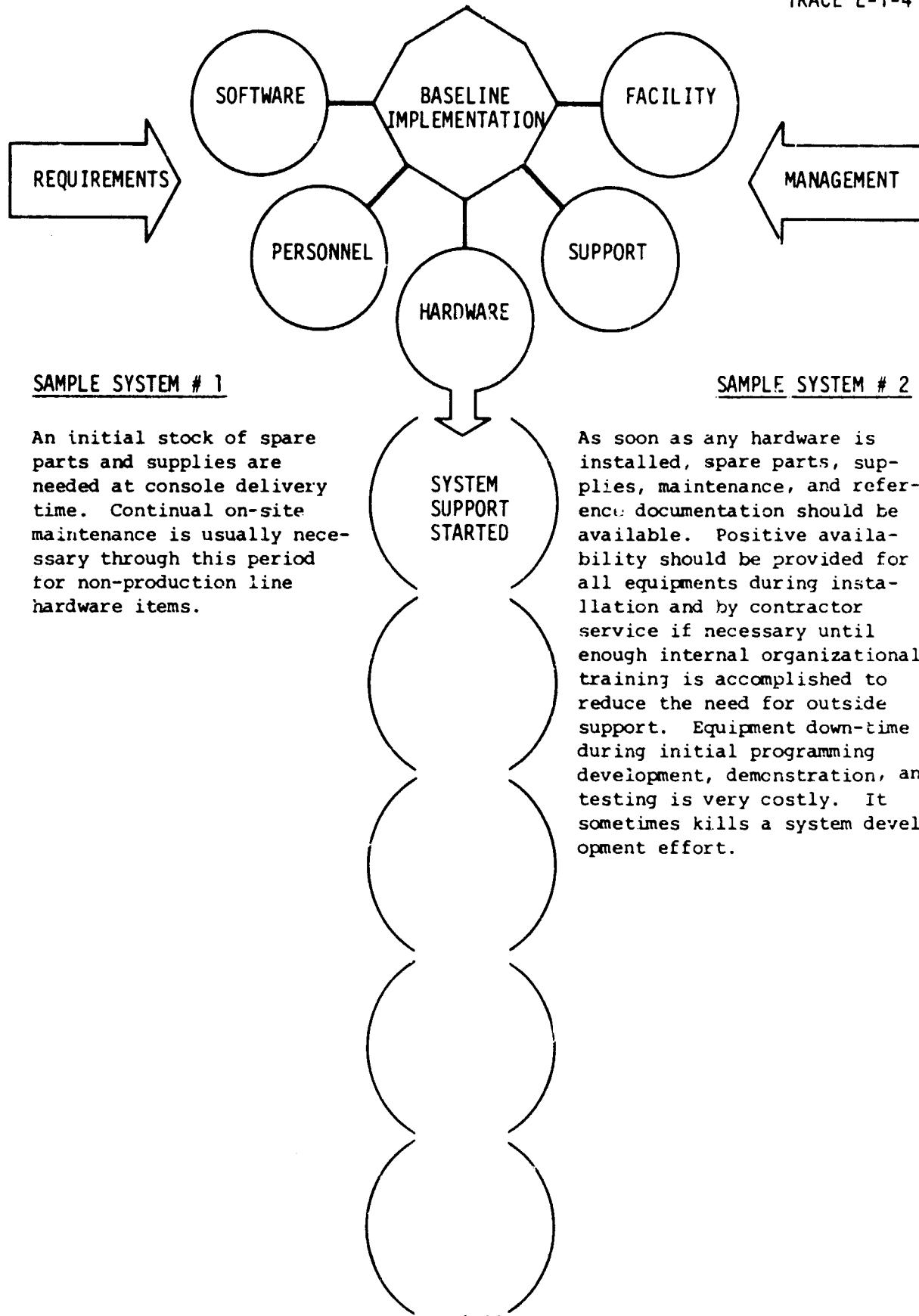
The training plans for each hardware element should be developed during the hardware's fabrication. Complex hardware that is of new design needs the support of the design or prototype fabrication engineer in this step. Effort spent here will help transition the hardware more easily through the Operational Acceptance Test.

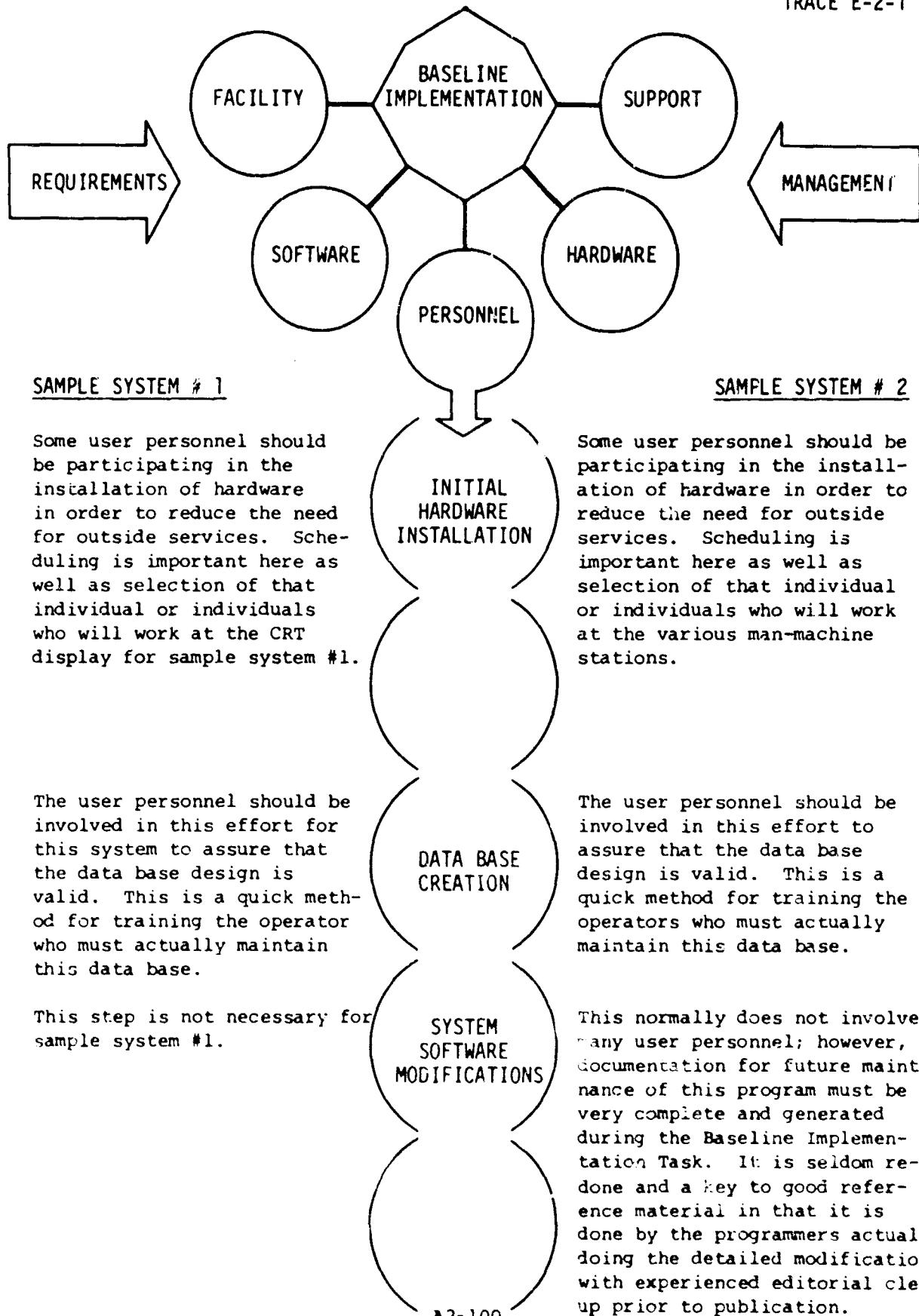
A careful review of the scenario will assist in test planning which will in turn assist in future hardware testing.

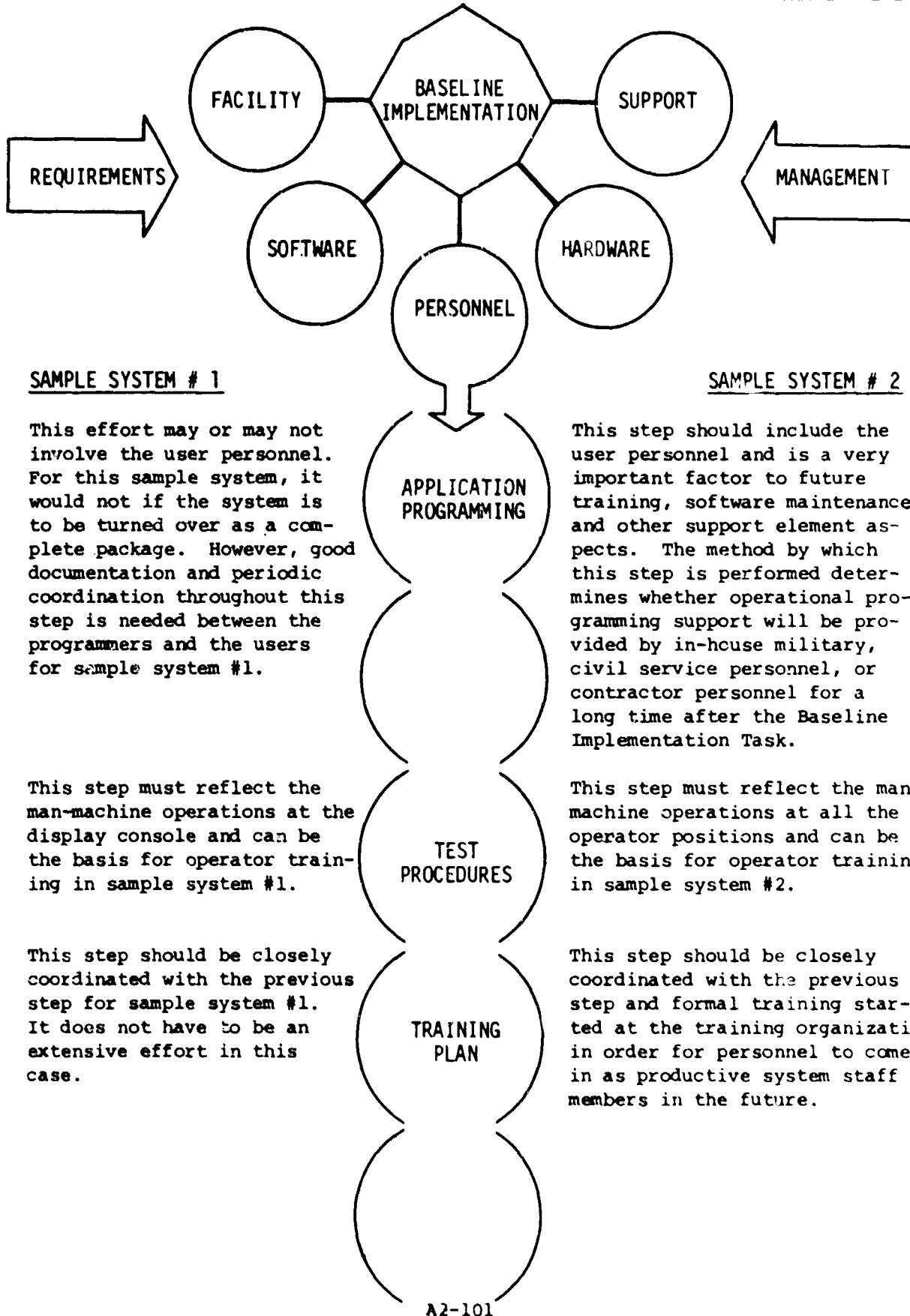
TRAINING PLAN

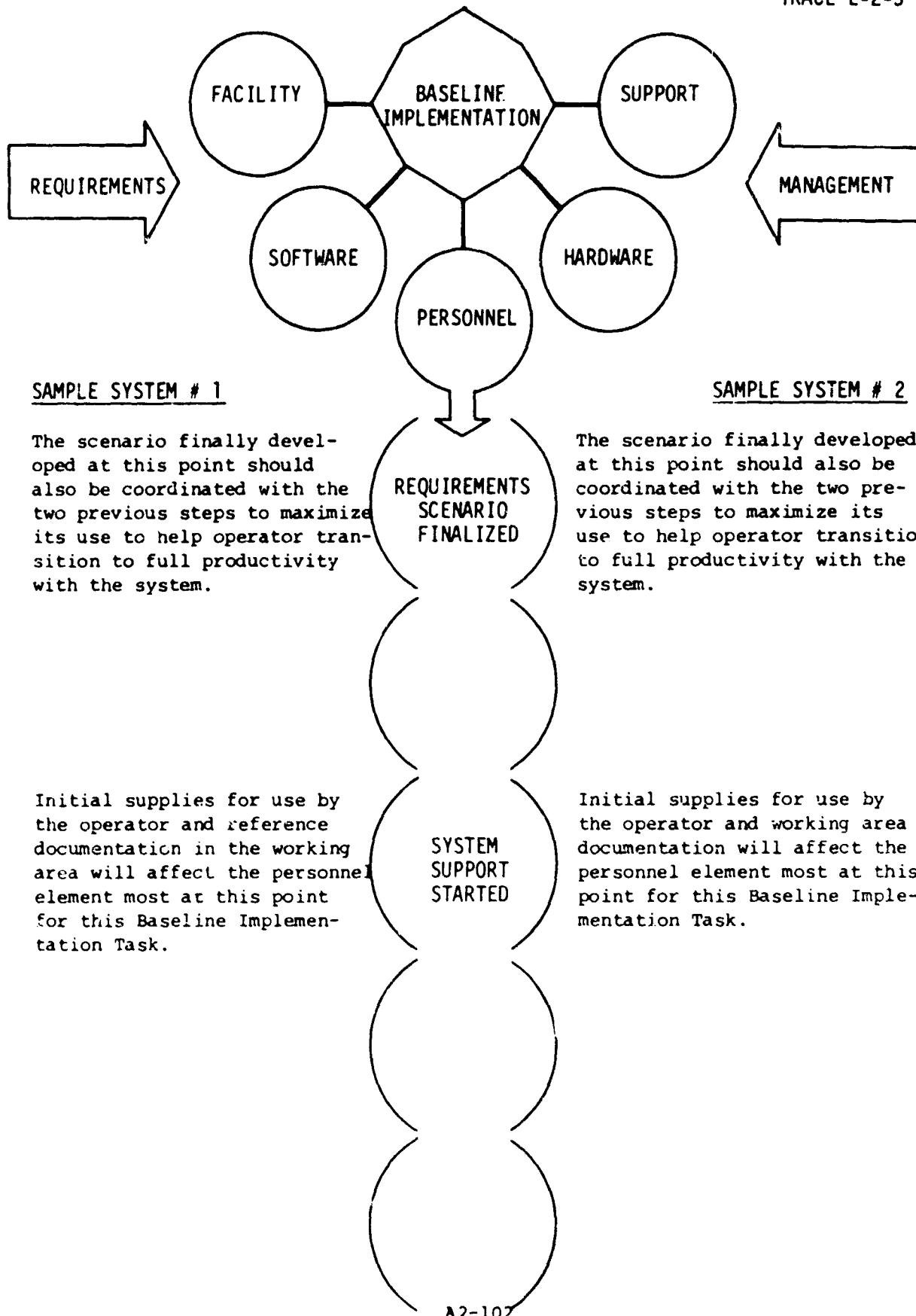
REQUIREMENTS SCENARIO FINALIZED

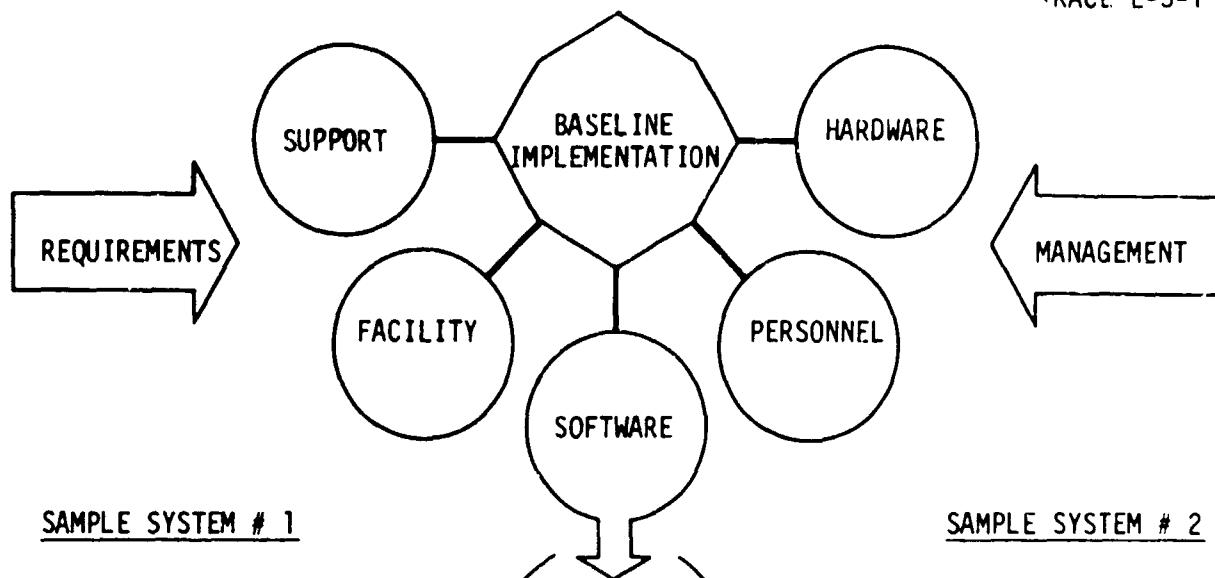
This step must be fully detailed in order to complete the test plans and data base creation steps. This effort is the "single-thread" needed to demonstrate the system's hardware separately as well as in an integrated manner later in the Baseline System Exercising Task.







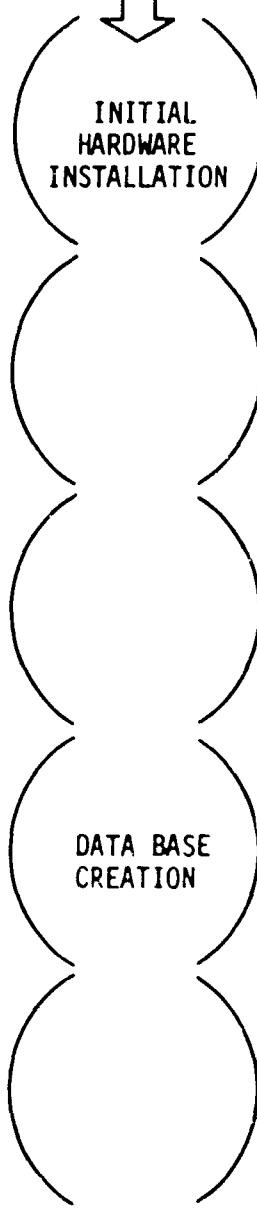


SAMPLE SYSTEM # 1

This step will be necessary in order to complete check-out of the application programs for sample system #1.

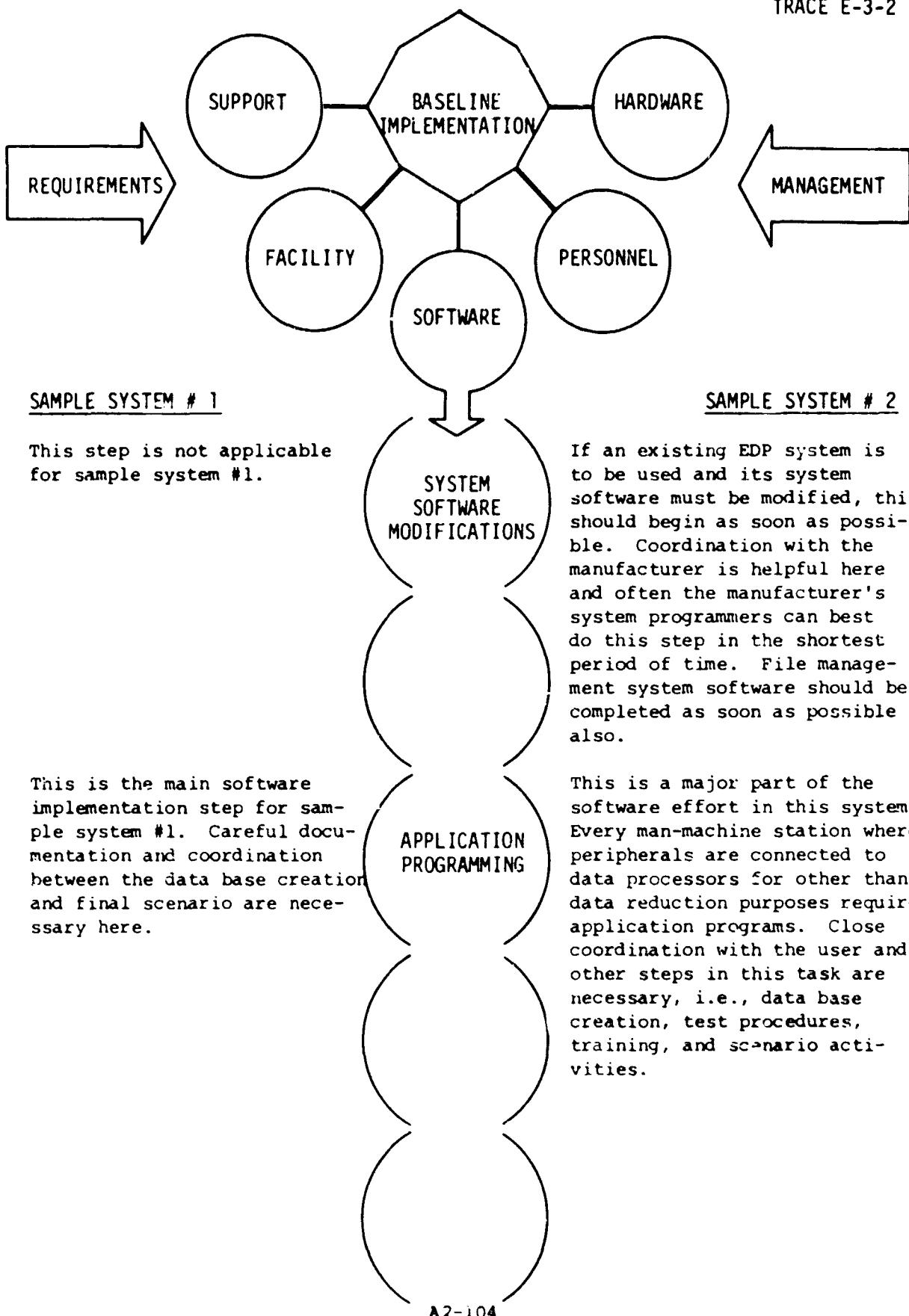
SAMPLE SYSTEM # 2

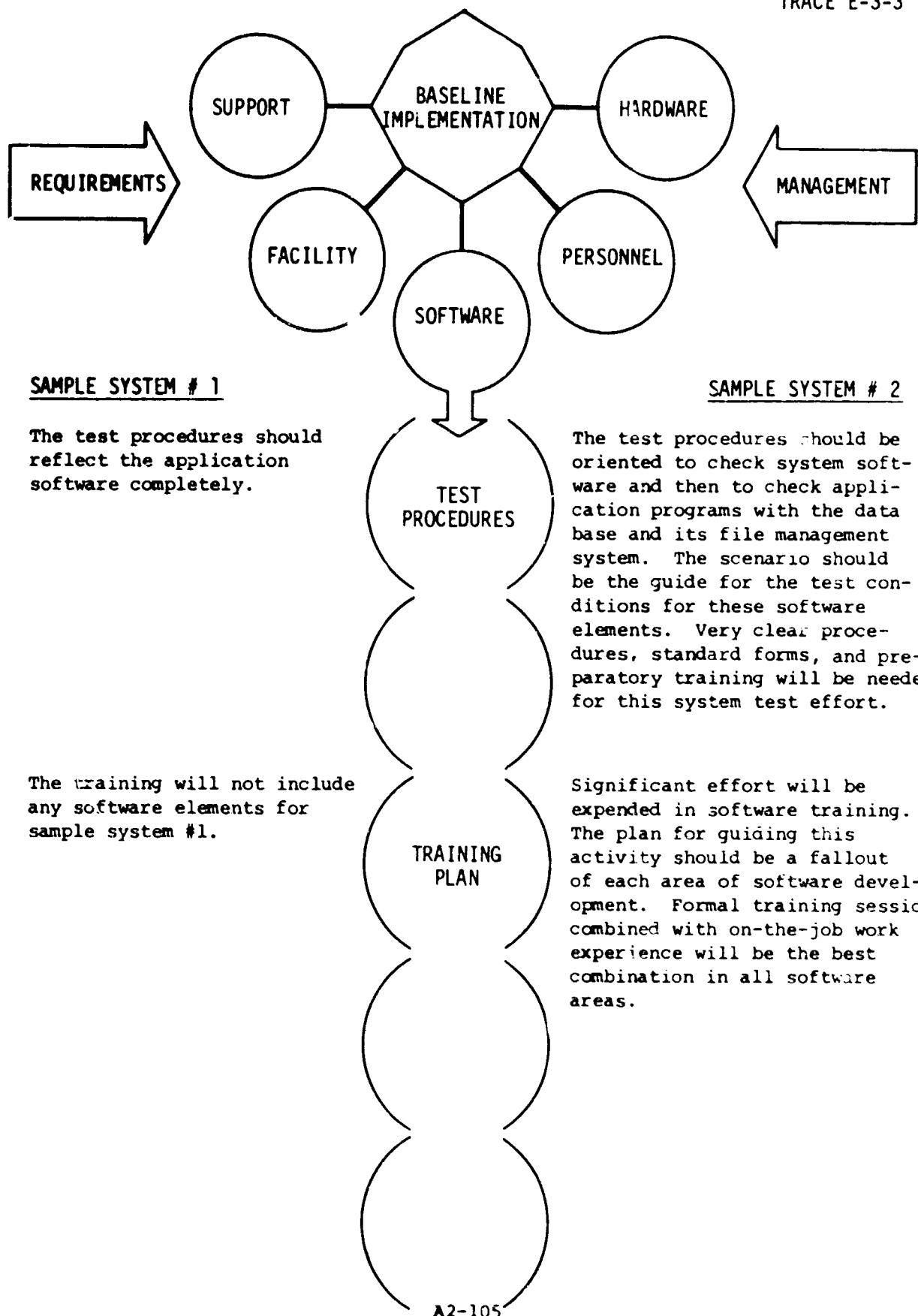
The data processing and one each of the on-line terminal or peripheral equipments should be installed in order to perform all programming steps. If this is not possible at an early enough point after System Specification to allow for system operation in time to meet set management schedules, then outside duplicate hardware elements will have to be used. Other functional hardware which are not connected to the EDP components are not needed for successful completion of this step

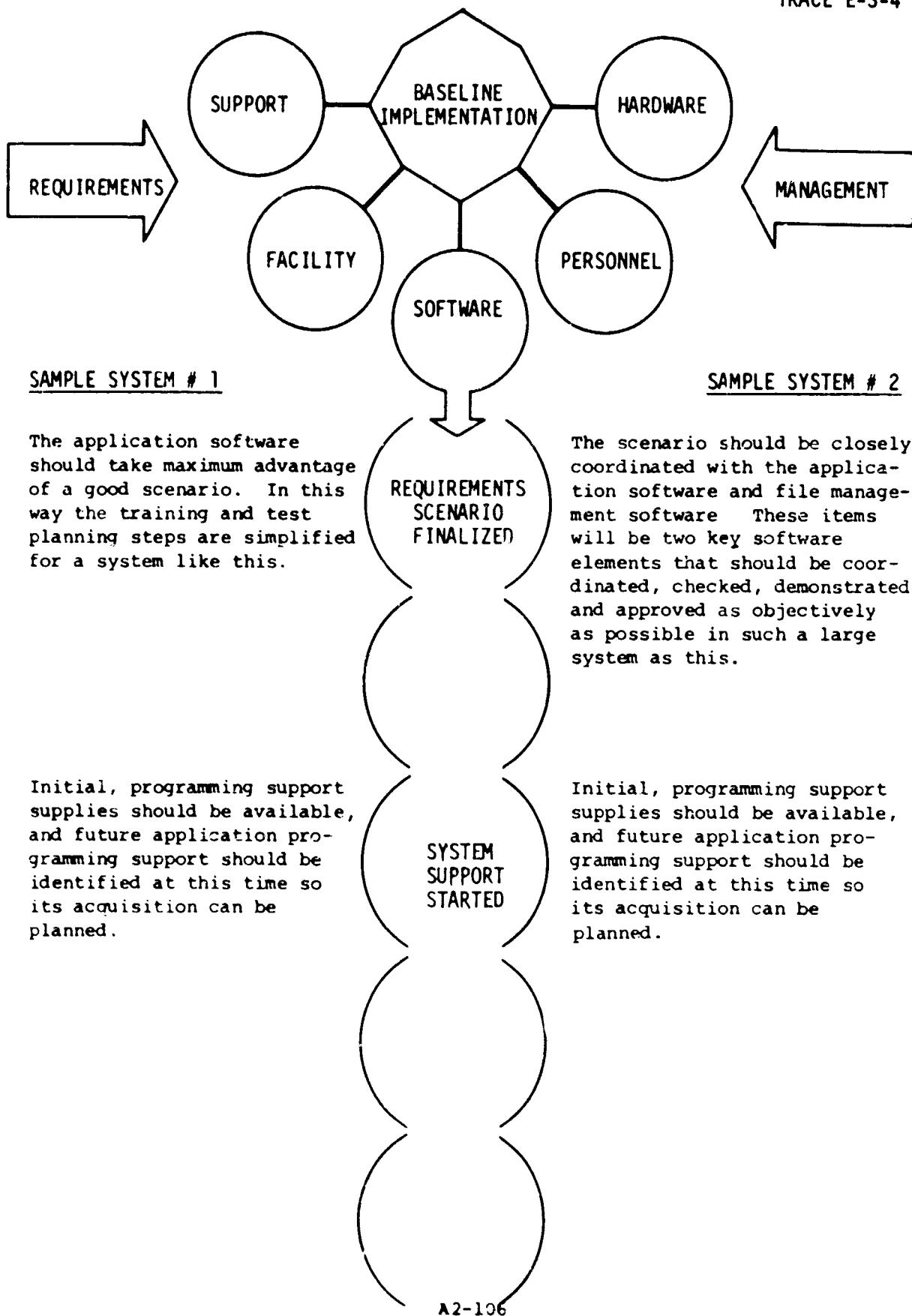


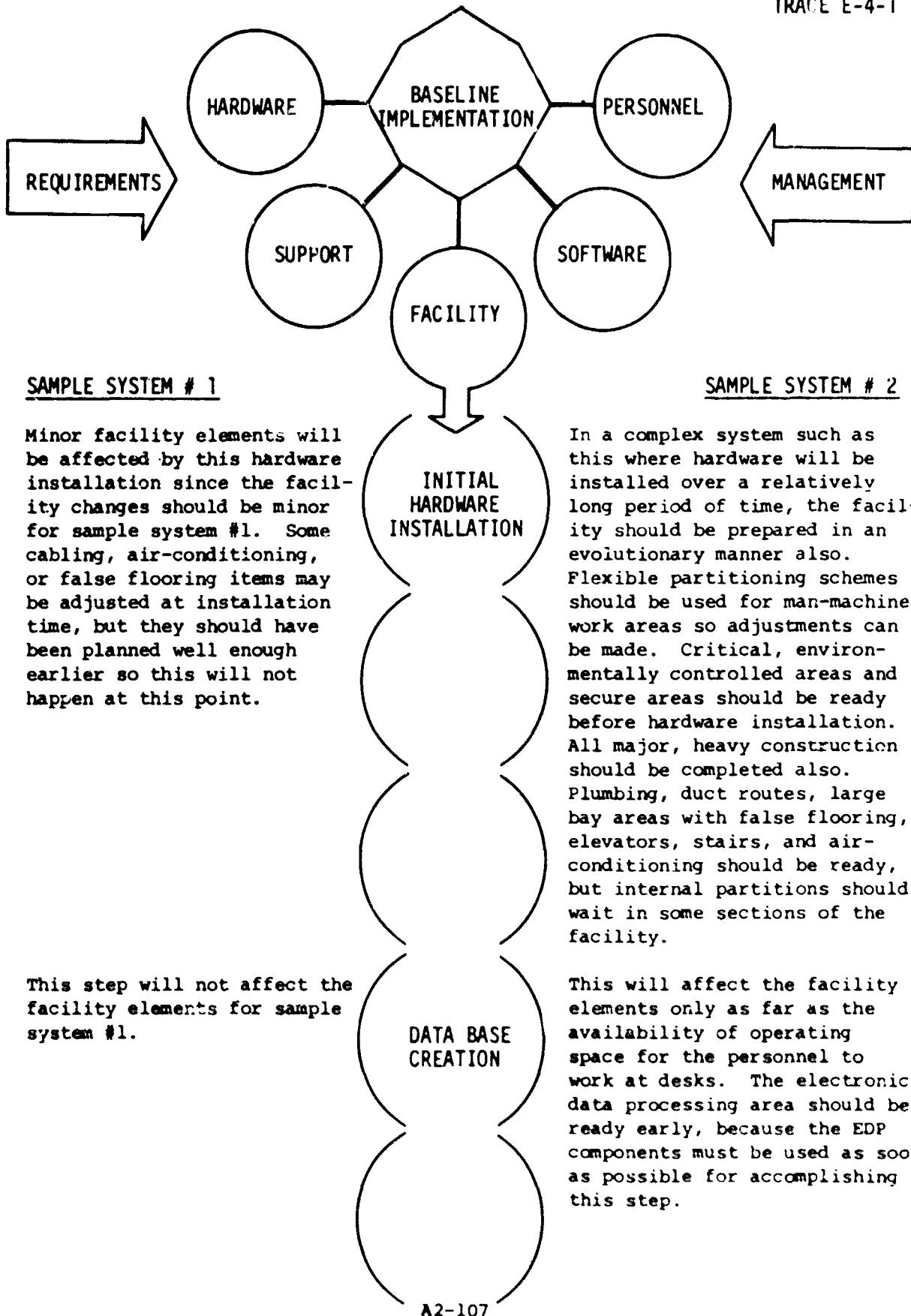
This step will affect the exercising of sample data during checkout of the application programs. This should be done as soon as possible after the System Specification Design Task is finished.

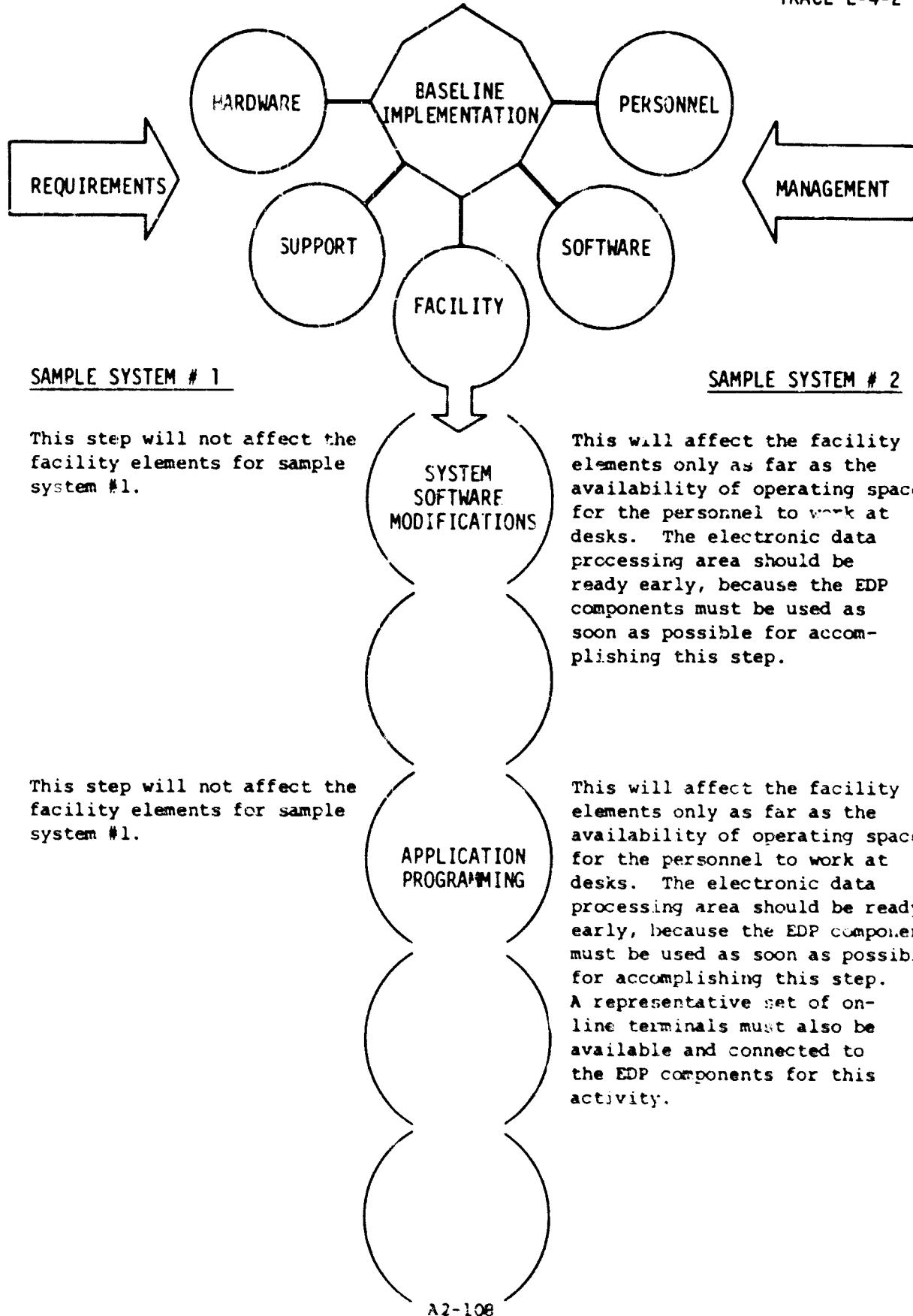
This step will affect the exercising of sample data during checkout of the application programs. This should be done as soon as possible after the System Specification Design Task is finished.

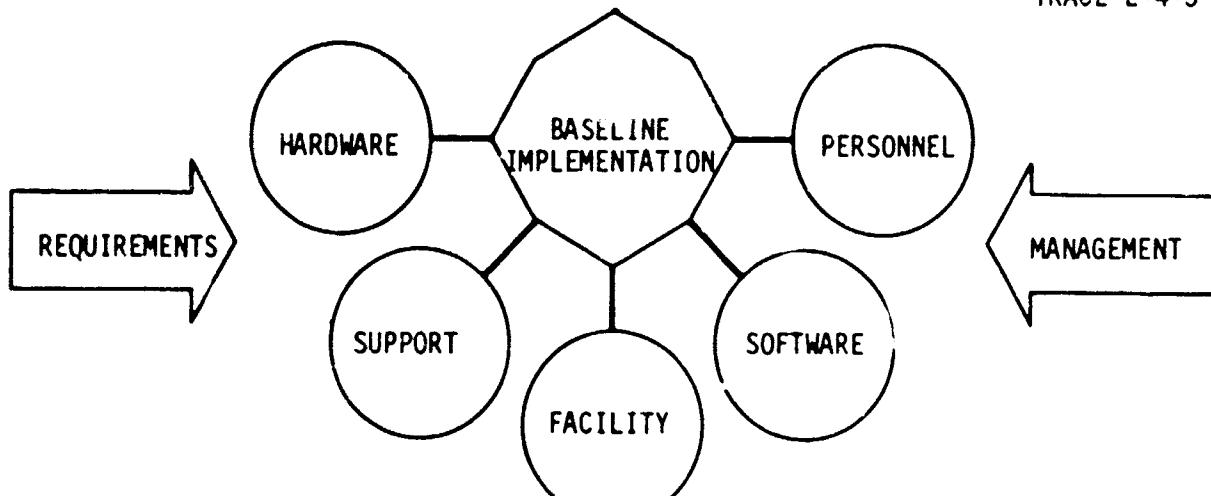










SAMPLE SYSTEM # 1

This step will not affect the facility elements for sample system #1.

SAMPLE SYSTEM # 2

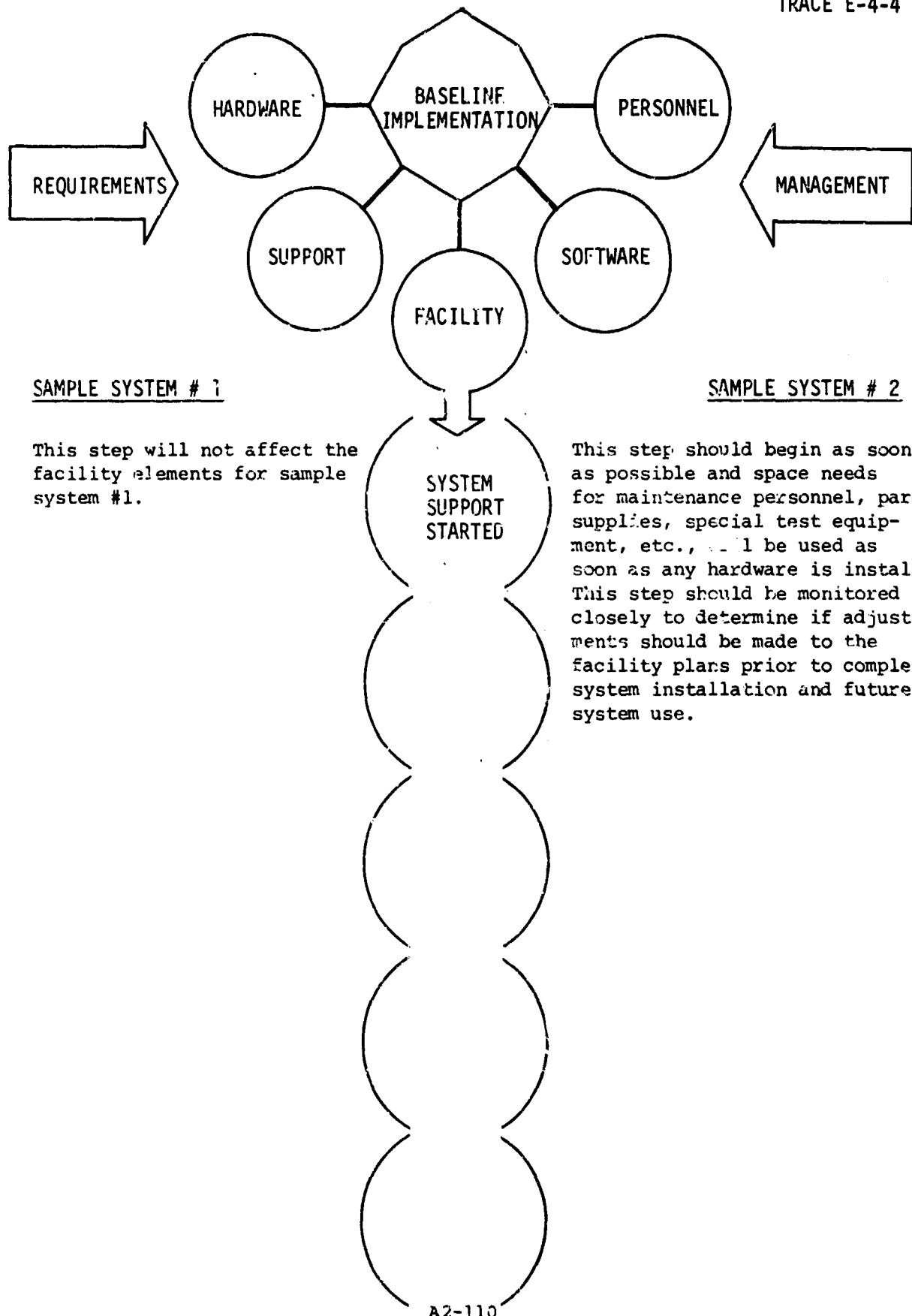
This will affect the facility elements only as far as the availability of operating space for the personnel to work at desks. The electronic data processing area should be ready early, because the EDP components must be used as soon as possible for accomplishing this step. A representative set of on-line terminals must also be available and connected to the EDP components for this activity.

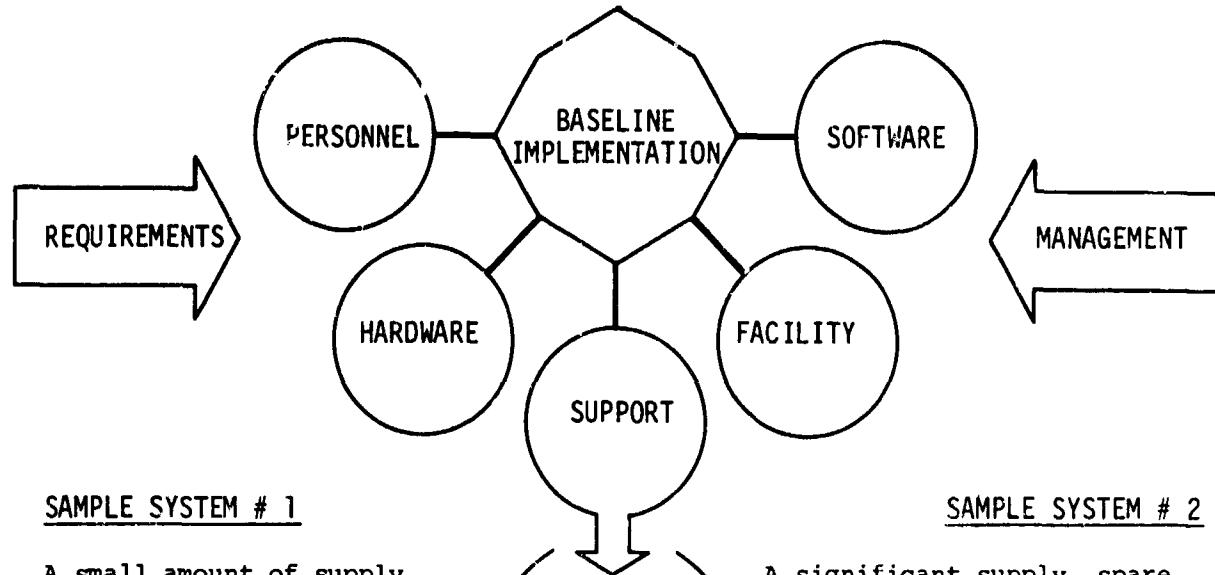
This step will not affect the facility elements for sample system #1.

This step has very little effect on the facility elements in any system. If new uncleared personnel will be trained prior to receipt of security clearances, then special areas may have to be set aside for this activity.

This step will not affect the facility elements for sample system #1.

This step has very little effect on the facility elements unless the facility is a shelterized complex instead of a fixed installation.



SAMPLE SYSTEM # 1

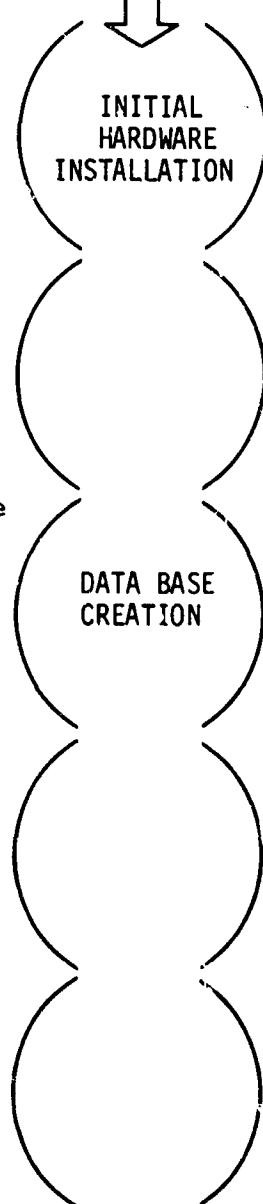
A small amount of supply, spare parts, and maintenance support will be needed as soon as the CRT display is installed. The initial support activity should be monitored to assure that support element planning has been complete and accurate.

SAMPLE SYSTEM # 2

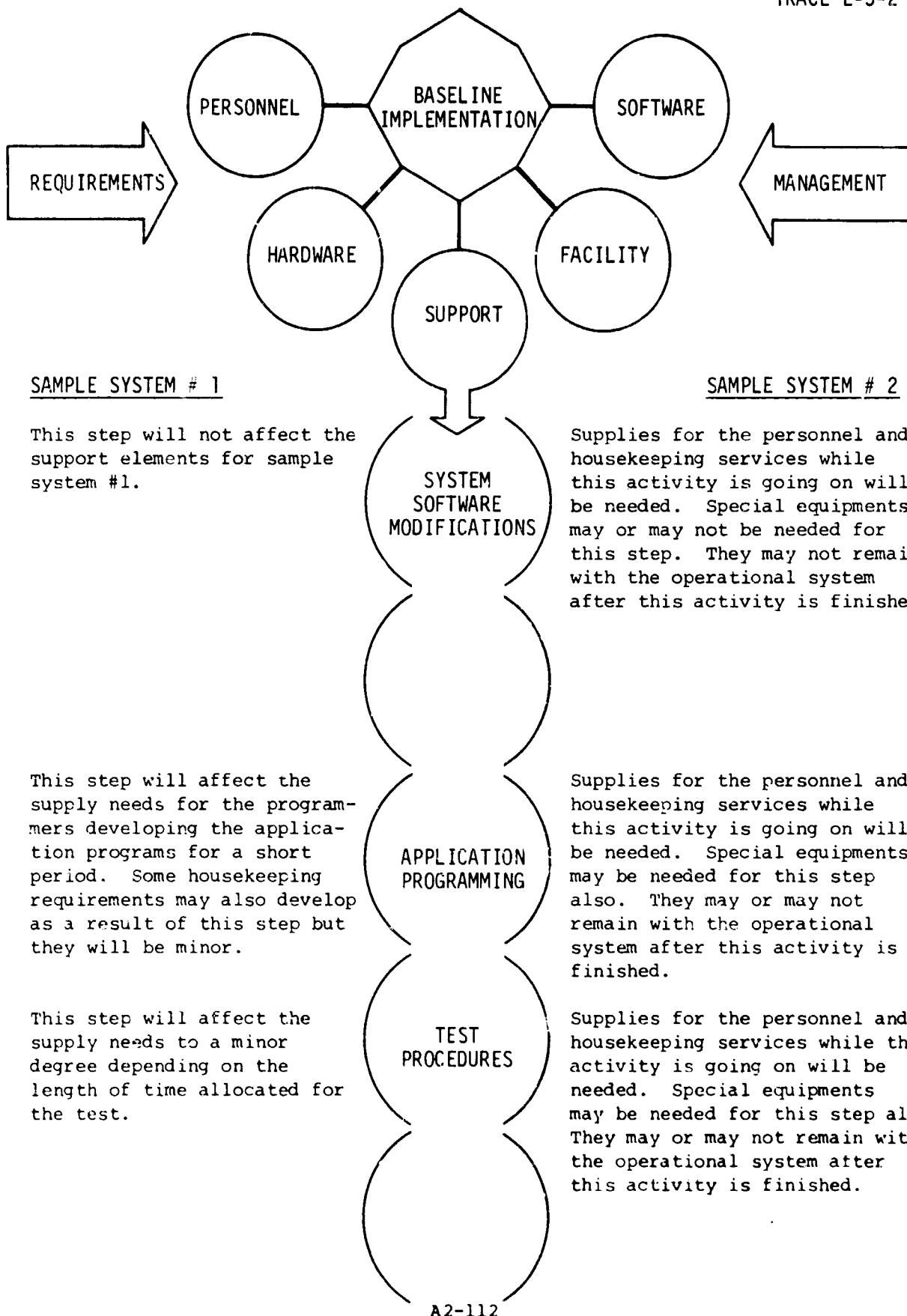
A significant supply, spare parts, and maintenance activity must start at this point. This activity should be monitored and evaluated closely in order to validate or adjust future hardware support needs.

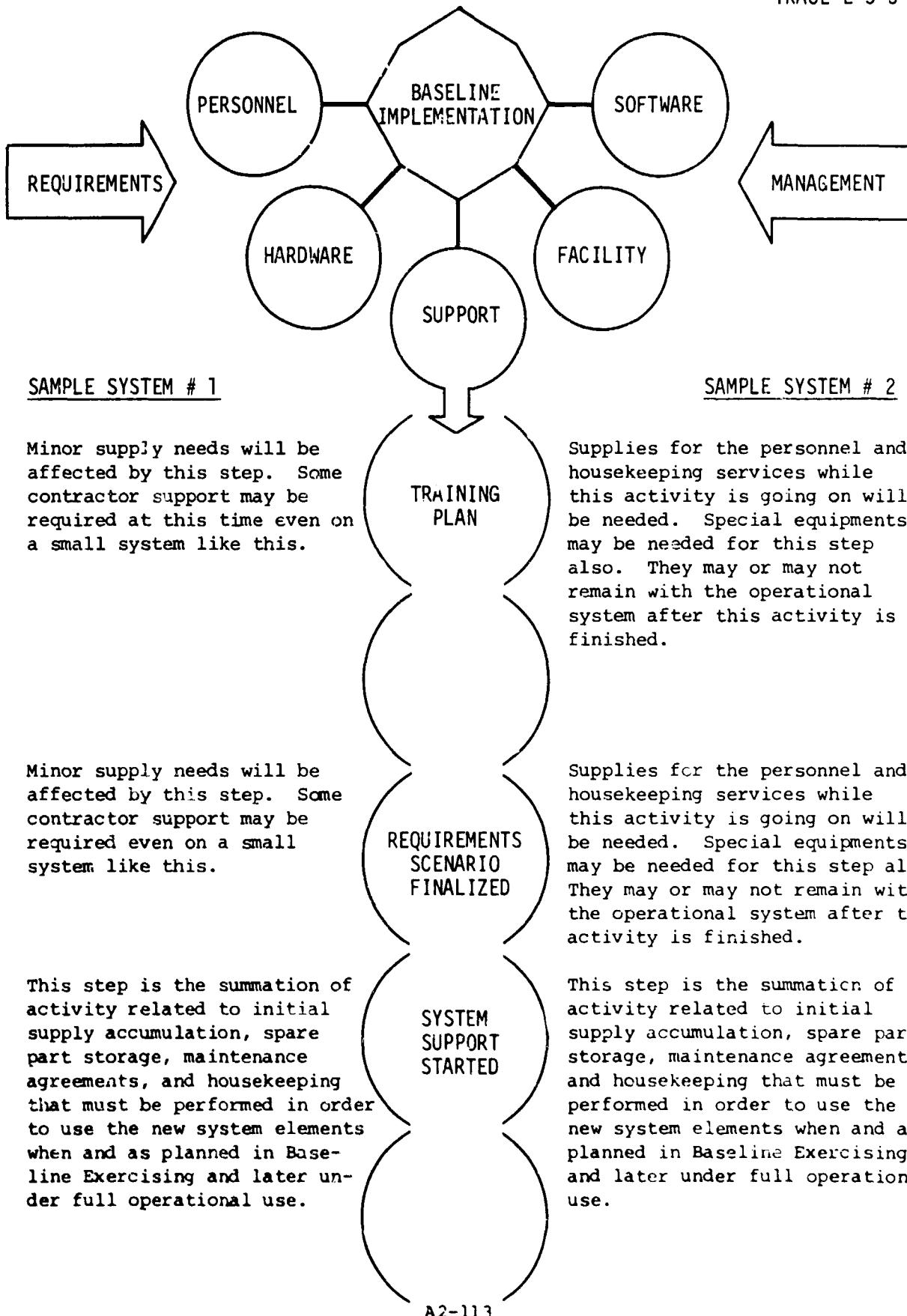
This step will not affect the support elements for sample system #1.

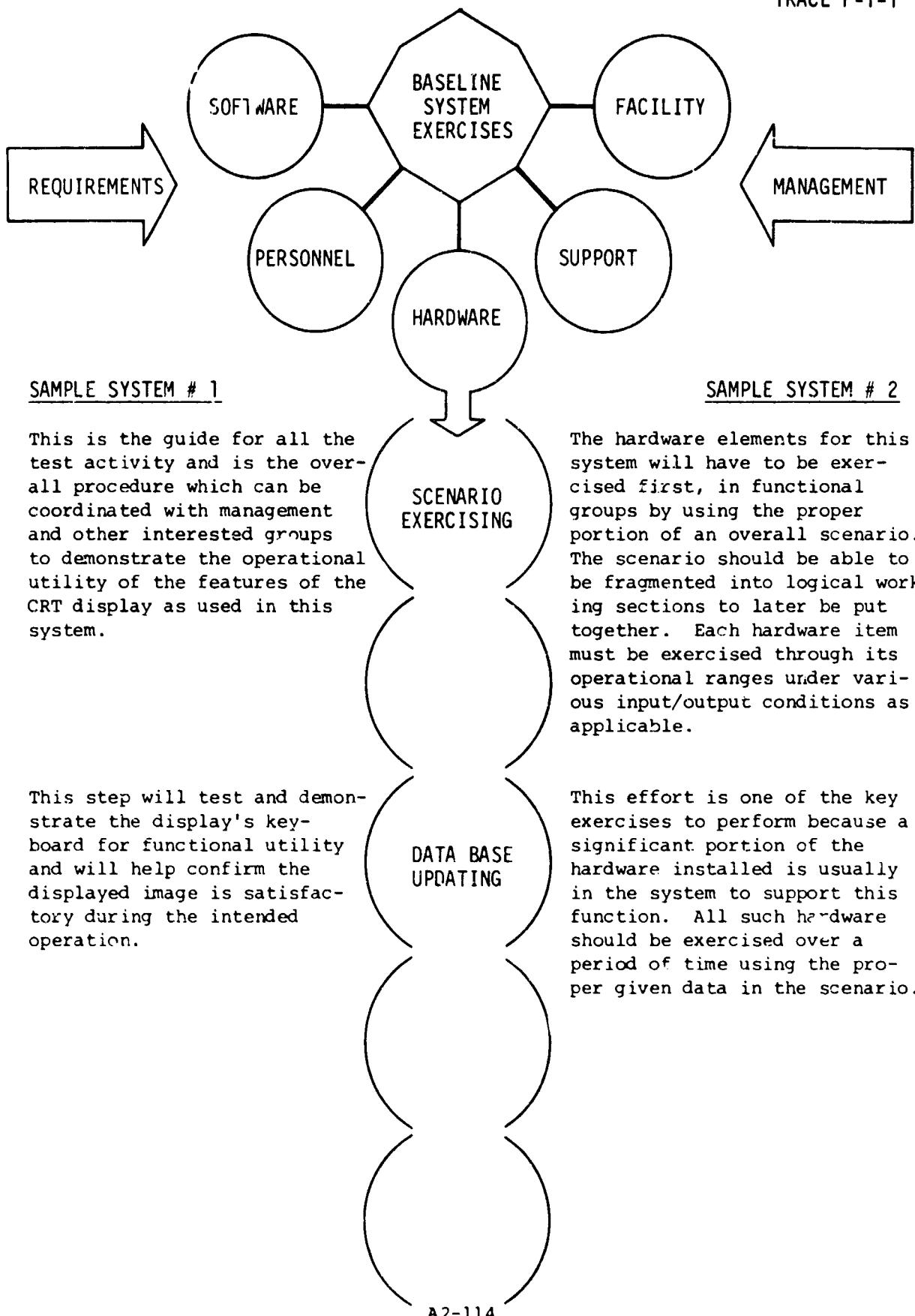
Supplies for the personnel and housekeeping services while this activity is going on will be needed. Special equipments may be needed for this step also. Some of these may or may not remain with the operational system after this activity is finished.

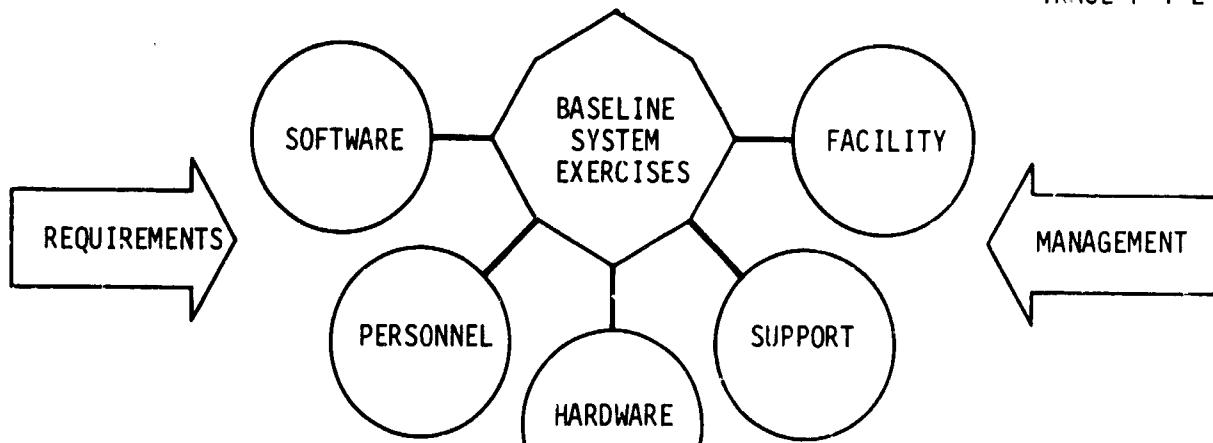


A2-111







SAMPLE SYSTEM # 1

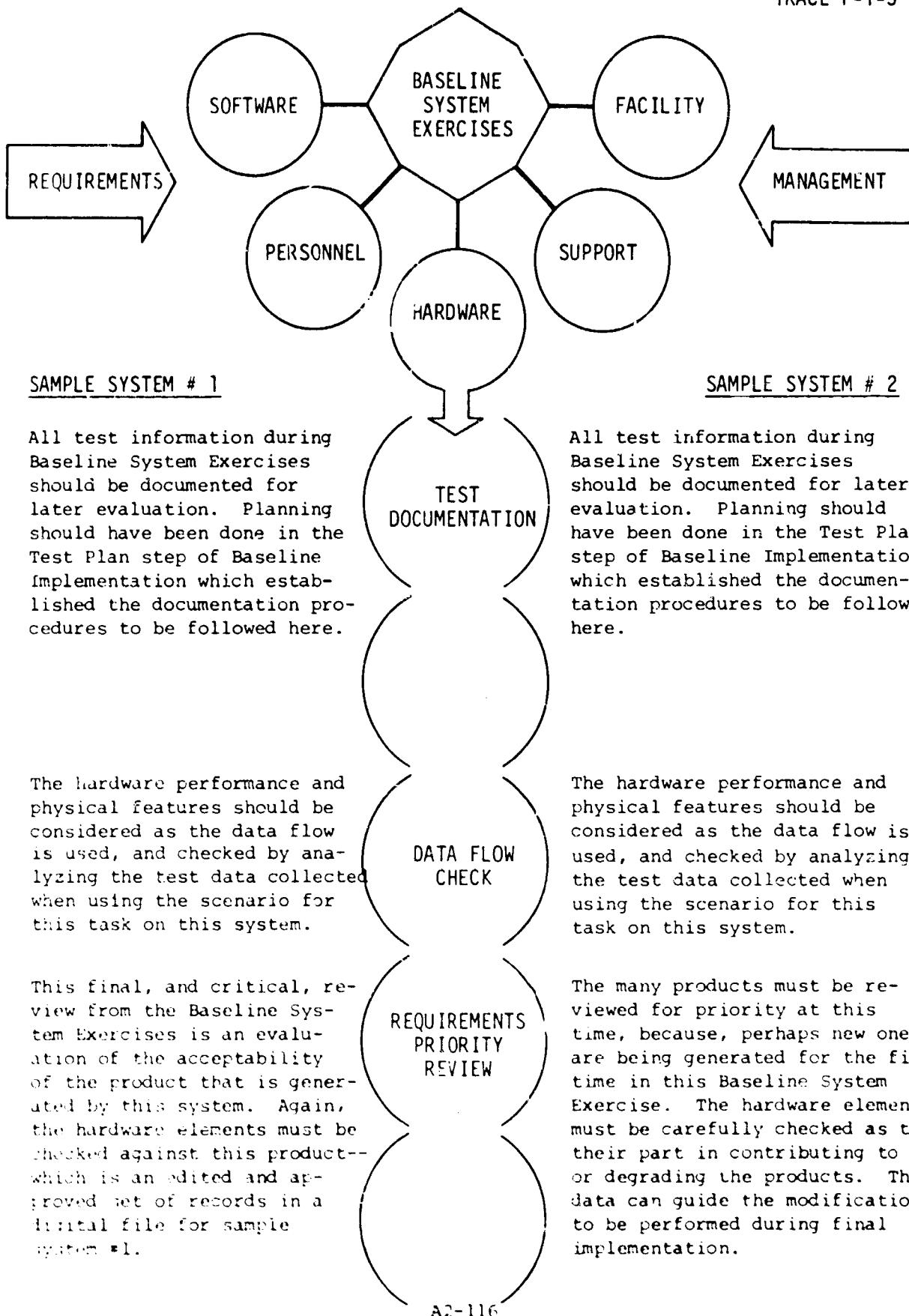
This step is the same as the previous one for sample system #1.

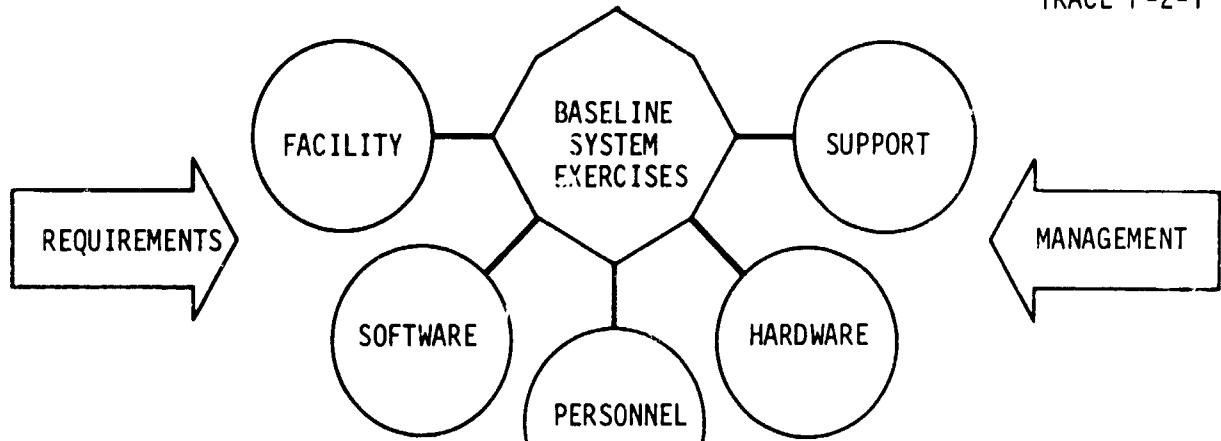
SAMPLE SYSTEM # 2

This effort is one of the key exercises to perform because a significant portion of the hardware is in the system to support this function. All such hardware should be exercised over a period of time using the proper given data in the scenario.

The time and activity data observed and recorded should be analyzed for hardware relationships. Undesirable data rates or operator experiences should be reviewed to determine if the display console design should be changed to improve these undesirable factors.

The time and activity data observed and recorded should be analyzed for hardware relationships. Undesirable data rates or operator experiences should be reviewed to determine if the display console design should be changed to improve these undesirable factors. The results of this analysis must be coordinated with management and is the user's information by which he can objectively support full system implementation or needed modifications to previously established specifications.



SAMPLE SYSTEM # 1

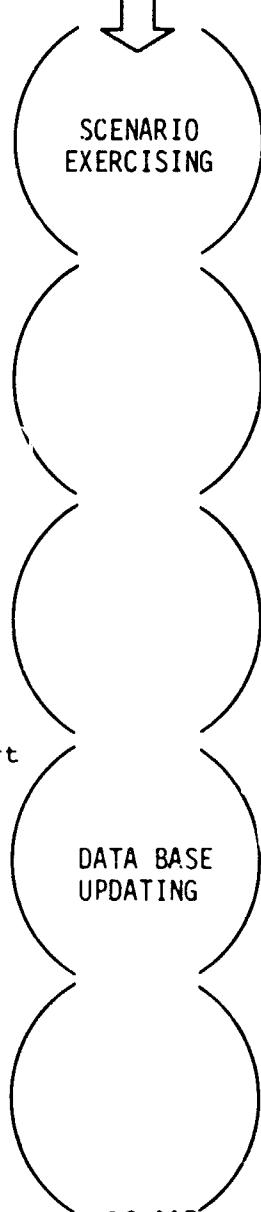
The use of this relatively small scenario will help validate the personnel estimates about experience required, numbers needed, and the operator working condition from a human factors standpoint. This step can also be a main operator training vehicle for sample system #1.

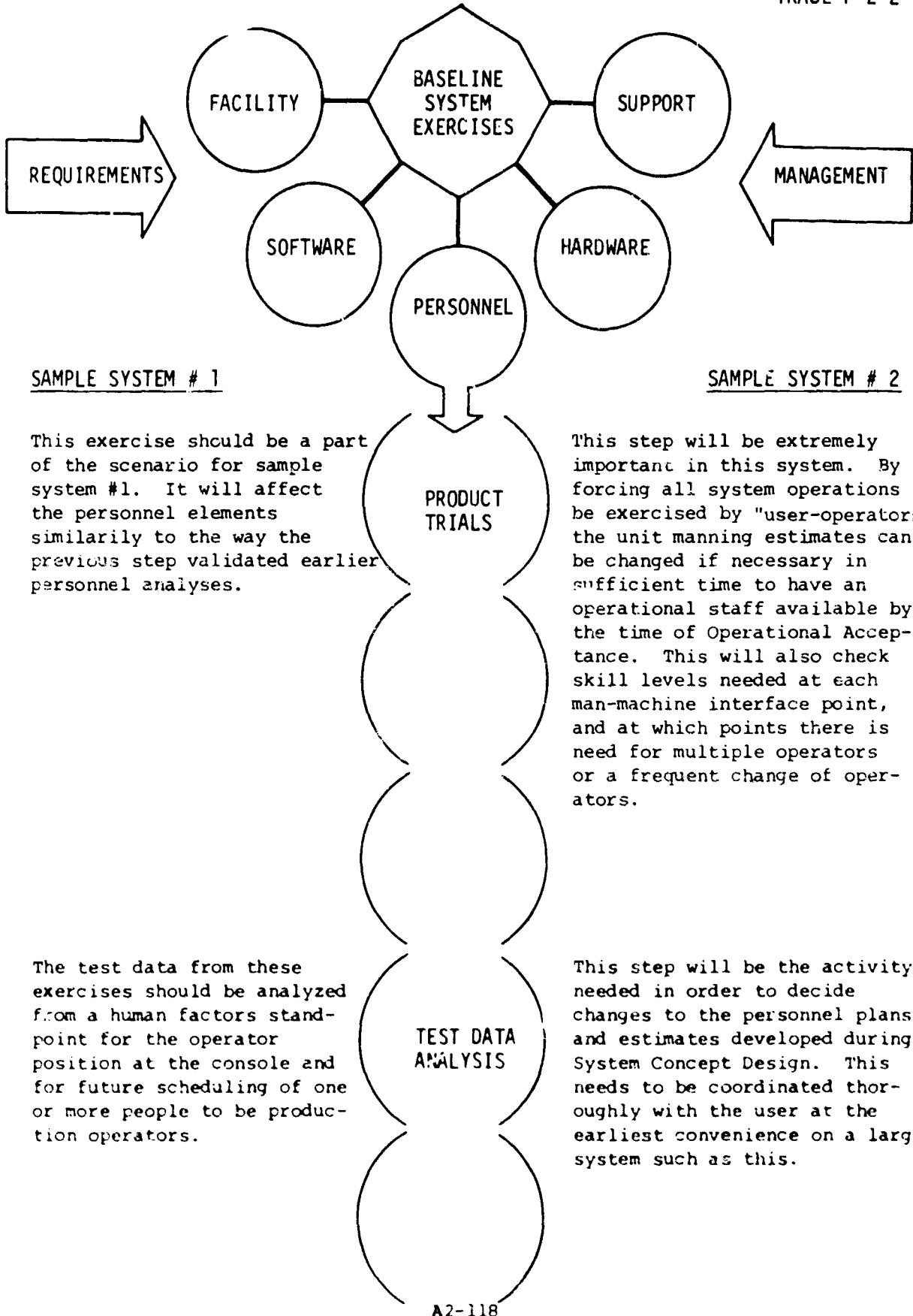
SAMPLE SYSTEM # 2

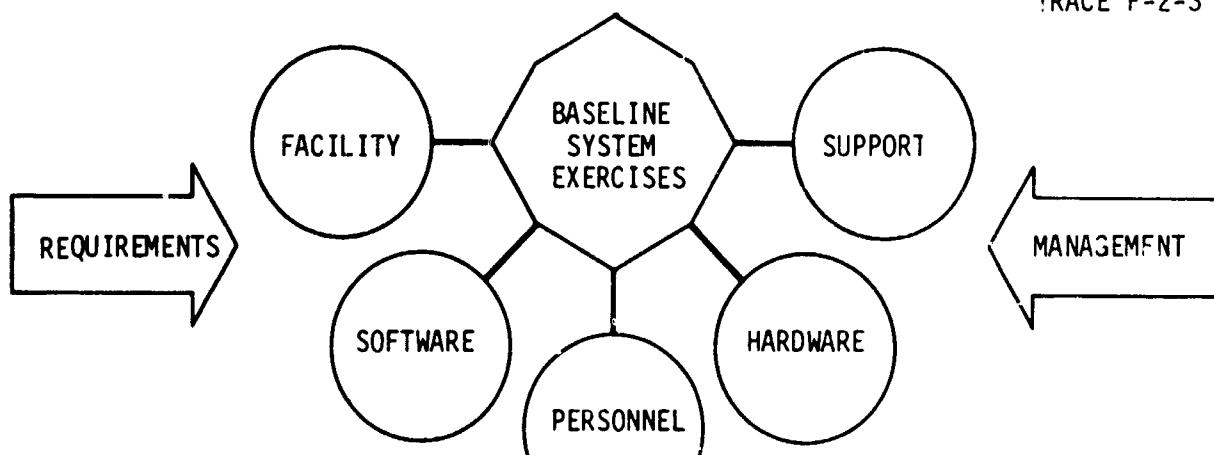
This step will be extremely important in this system. By forcing all system operations to be exercised by "user-operators," the unit manning estimates can be changed if necessary in sufficient time to have an operational staff available by the time of Operational Acceptance. This will also check skill levels needed at each man-machine interface point, and at which points there is need for multiple operators or a frequent change of operators.

This exercise should be a part of the scenario for sample system #1. It will affect the personnel elements in much the same way that the previous step validated earlier personnel analyses.

This step will be extremely important in this system. By forcing all system operations to be exercised by "user-operators," the unit manning estimates can be changed if necessary in sufficient time to have an operational staff available by the time of Operational Acceptance. This will also check skill levels needed at each man-machine interface point, and at which points there is need for multiple operators or a frequent change of operators.





SAMPLE SYSTEM # 1

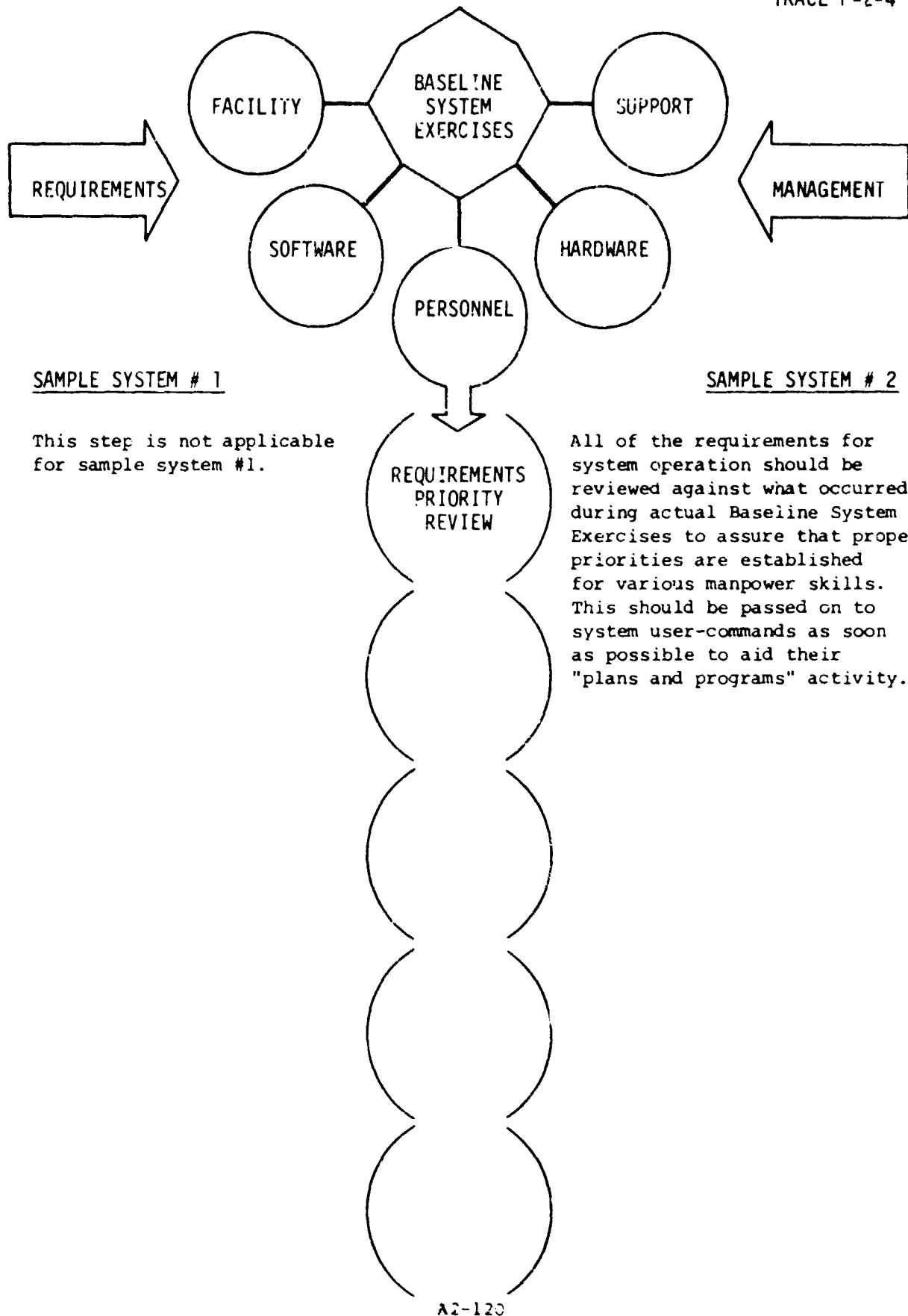
This step will help provide future training data and if this Baseline System Exercise is close to the final task of Operational Acceptance, then it can be used as part of the acceptance material for sample system #1.

SAMPLE SYSTEM # 2

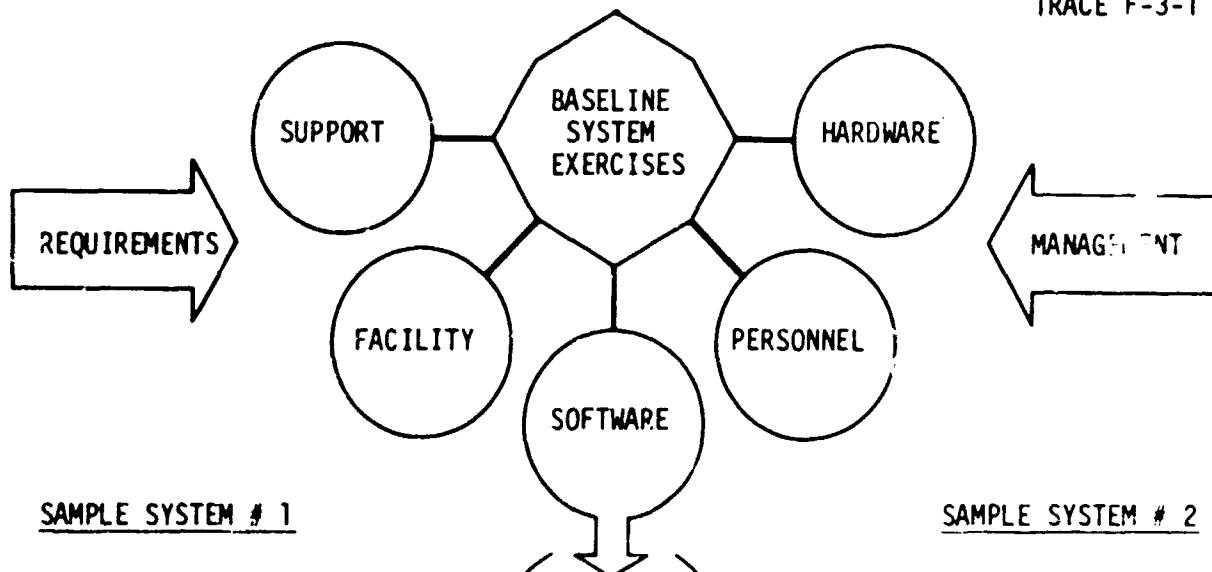
This documentation is vital for reference and direct use in preparation of future training materials for operator personnel. This may be better classified as a support element; however, it is closely associated with the personnel plans also. The test documentation is needed by the system analyst to justify changes or current approaches when they are validated.

The data flow performed at the CRT display should be closely reviewed and compared to that specified early in order to assure that all personnel experience requirements have been exercised. This is necessary to avoid overlooking a key operation that may be needed in an untested situation which would illustrate a heretofore overlooked personnel deficiency as the system is initially installed.

This step will be important to personnel, because any changes will undoubtedly affect the number of manual positions and the skill requirements. The length of time each operator stays at the various operator-positions or can handle more than one work task should be evaluated for optimum data flow by a minimum number of personnel.



TRACE F-3-1



SAMPLE SYSTEM # 1

This step should primarily test the application programs and validity of the data files' organization in sample system #1.

SAMPLE SYSTEM # 2

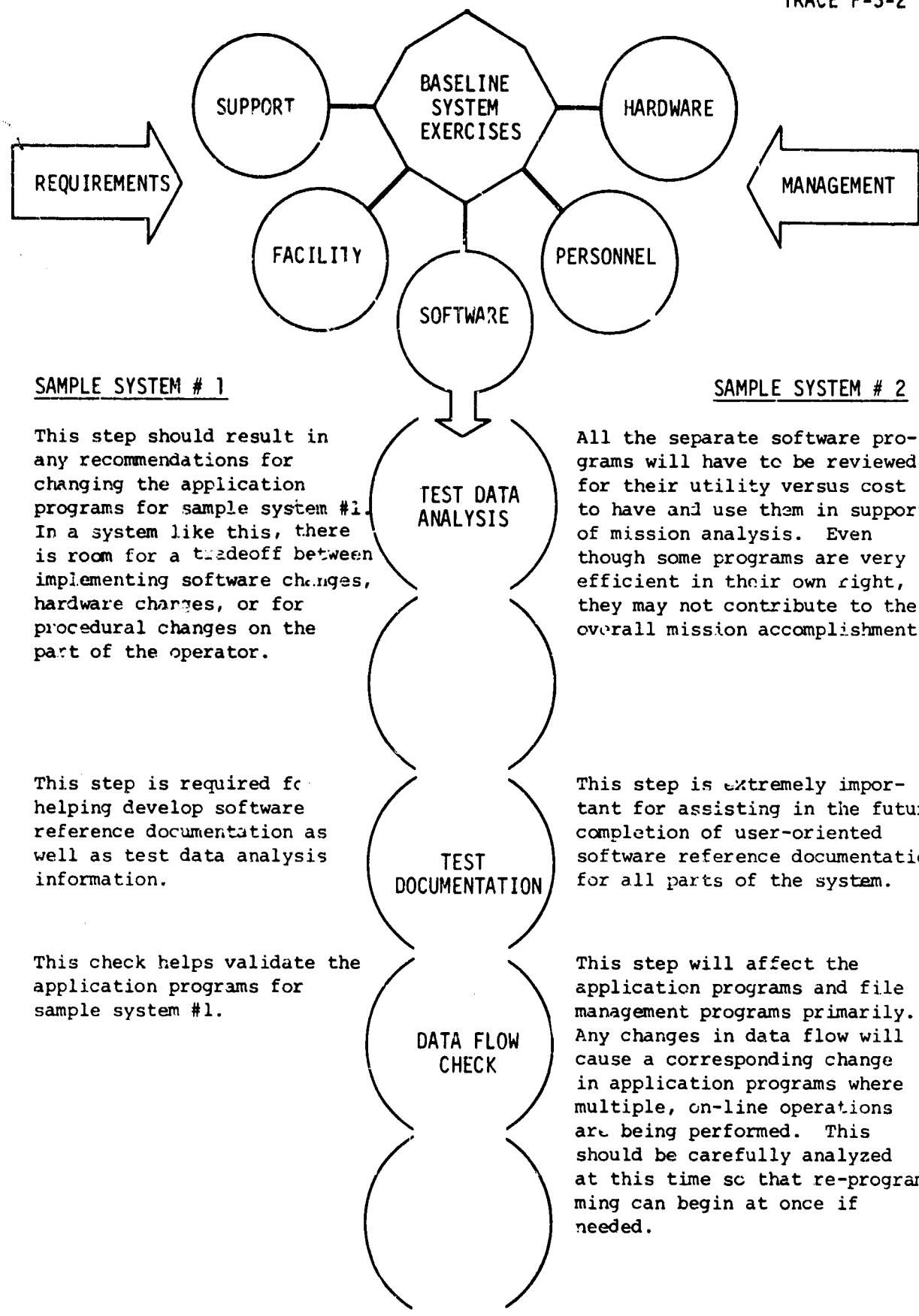
This step will exercise all portions of the software but should especially be concerned with the application programs and the file management system programs. All data conversion routines and utility programs must also be exercised under control of the executive from all on-line stations or batch operating stations identified in the System Concept Design.

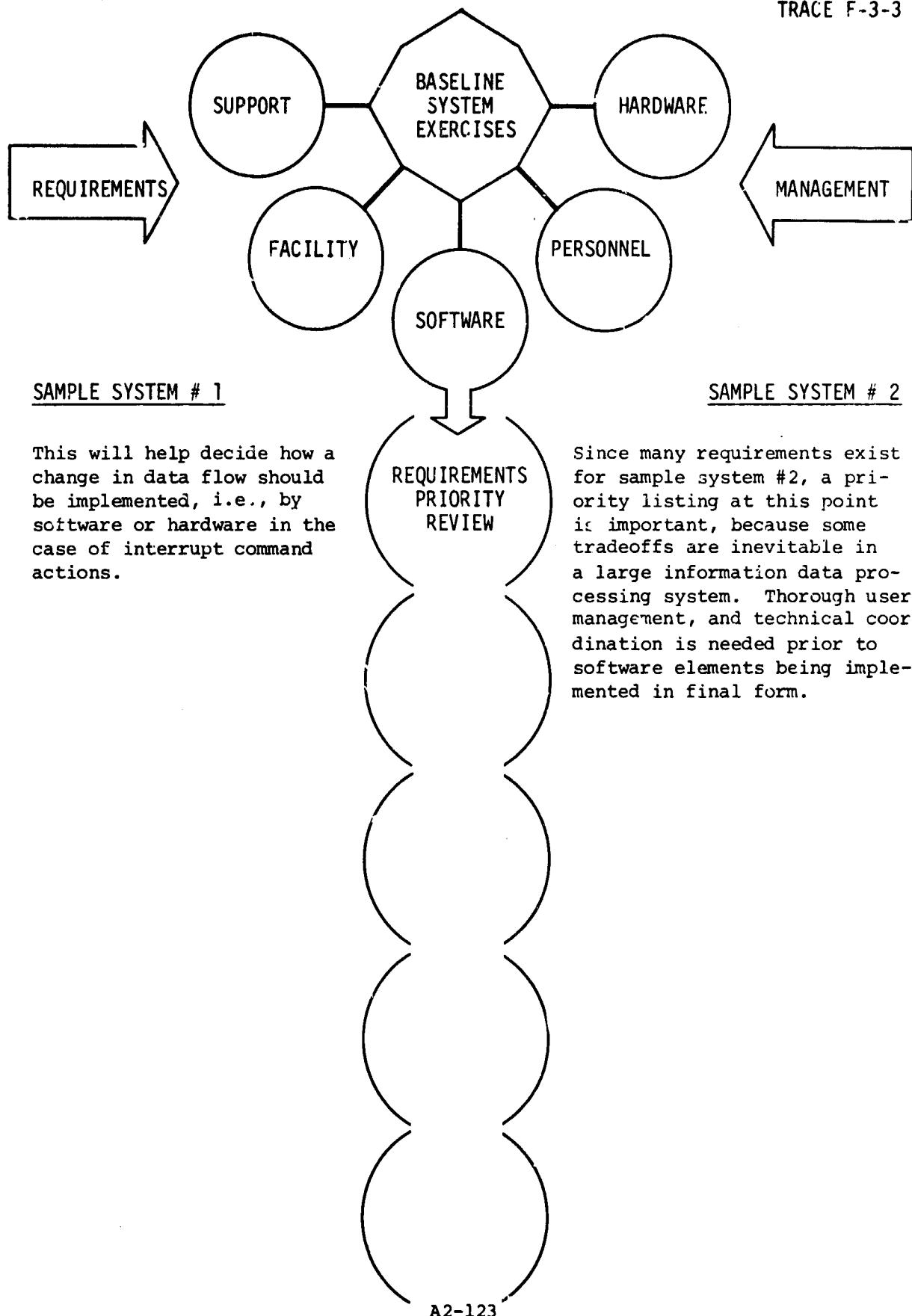
This step should primarily test the application programs and validity of the data files' organization in sample system #1.

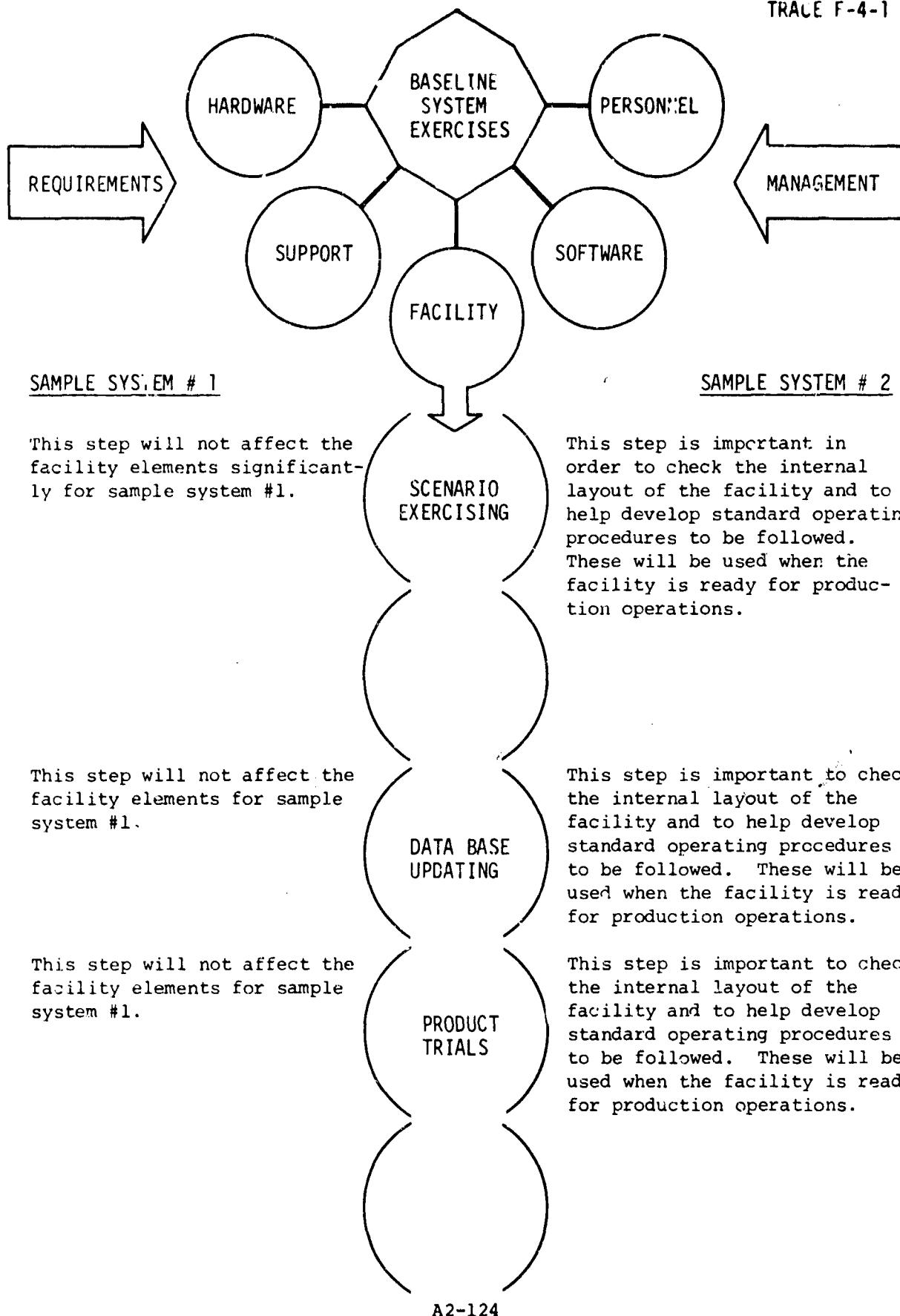
This will be a sub-set of the scenario and will check those same software elements as mentioned in the previous step, but primarily for the data base update functions.

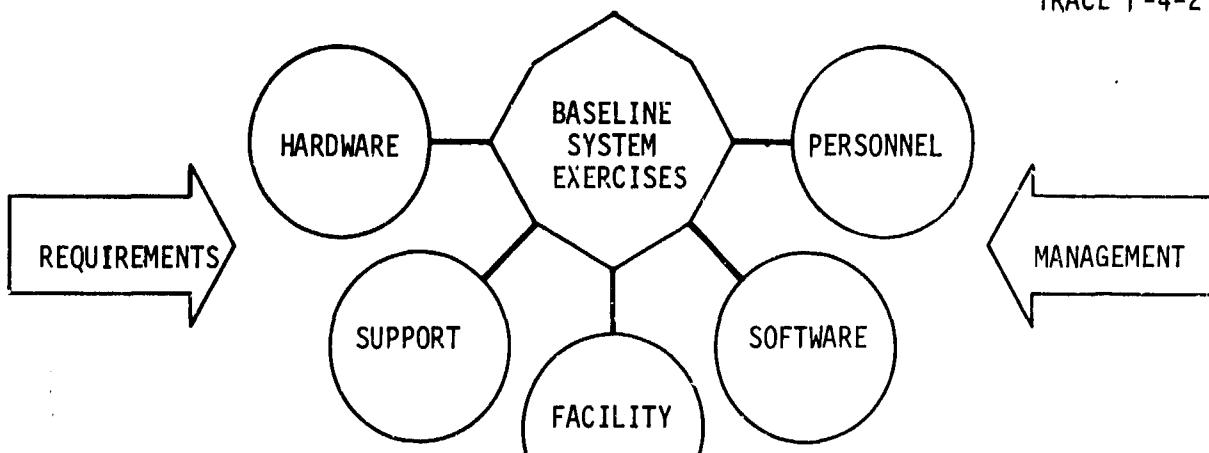
This step should primarily test the application programs and validity of the data files' organization in sample system #1.

This will be a sub-set of the scenario and will check those same software elements as mentioned in that step, but primarily for the research, analysis, and product generation functions.







SAMPLE SYSTEM # 1

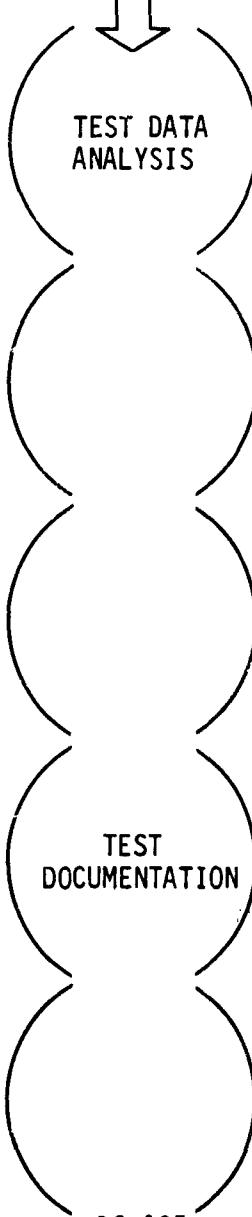
This step will not affect the facility elements for sample system #1.

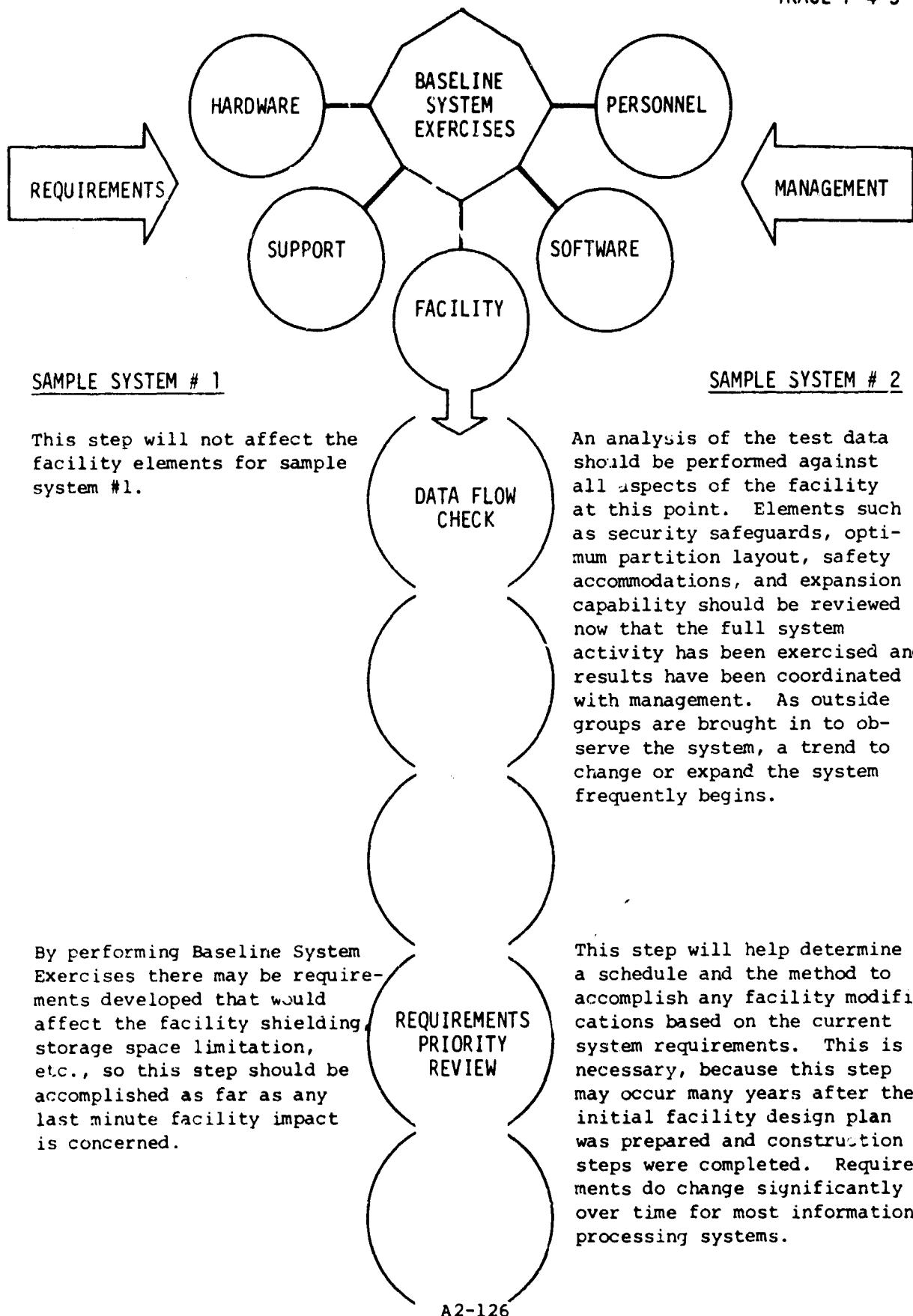
SAMPLE SYSTEM # 2

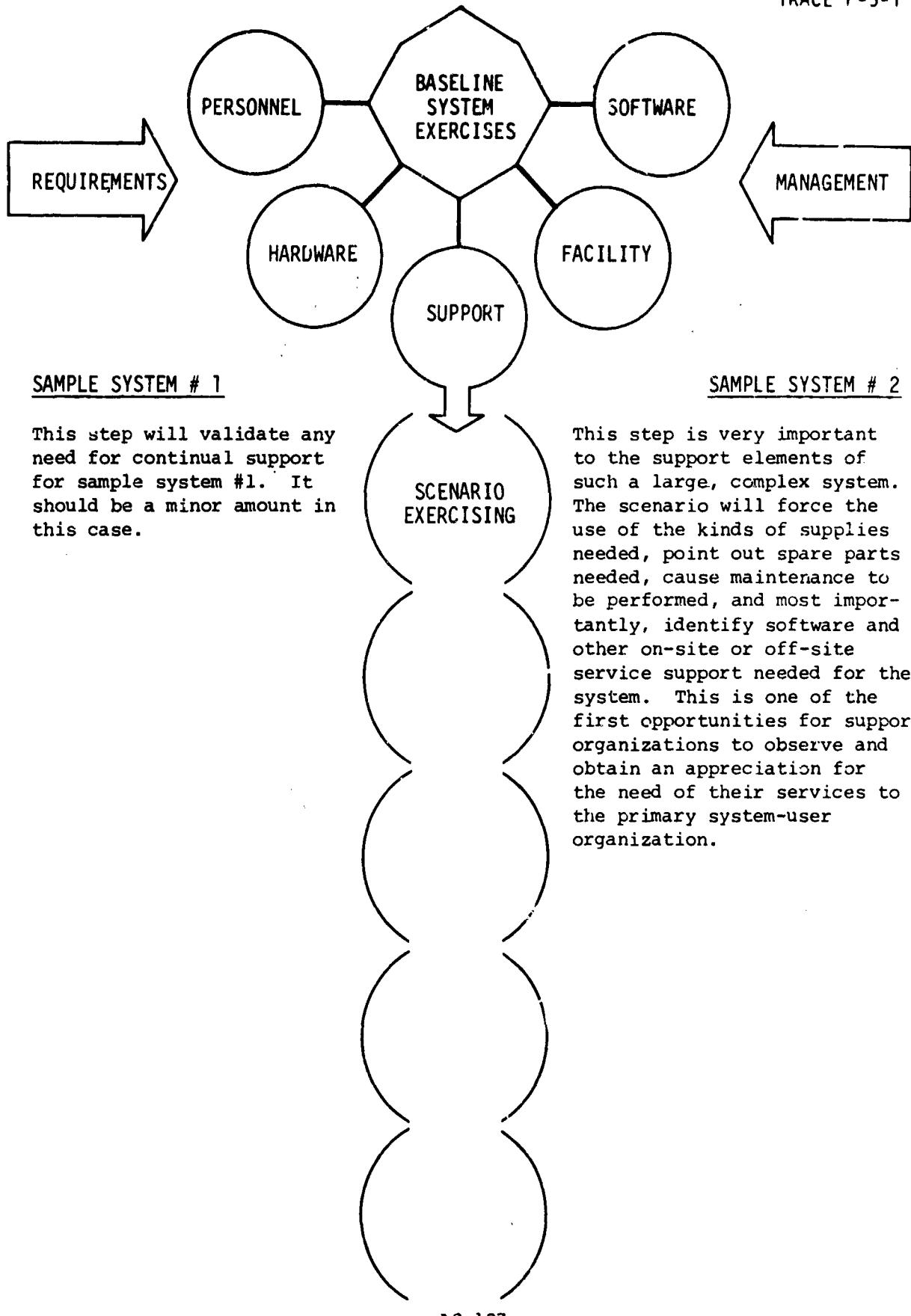
An analysis of the test data should be performed against all aspects of the facility at this point. Elements such as security safeguards, optimum partition layout, safety accommodations, and expansion capability should be reviewed now that the full system activity has been exercised and results have been coordinated with management. As outside groups are brought in to observe the system, a trend to change or expand the system frequently begins.

This step will not affect the facility elements for sample system #1.

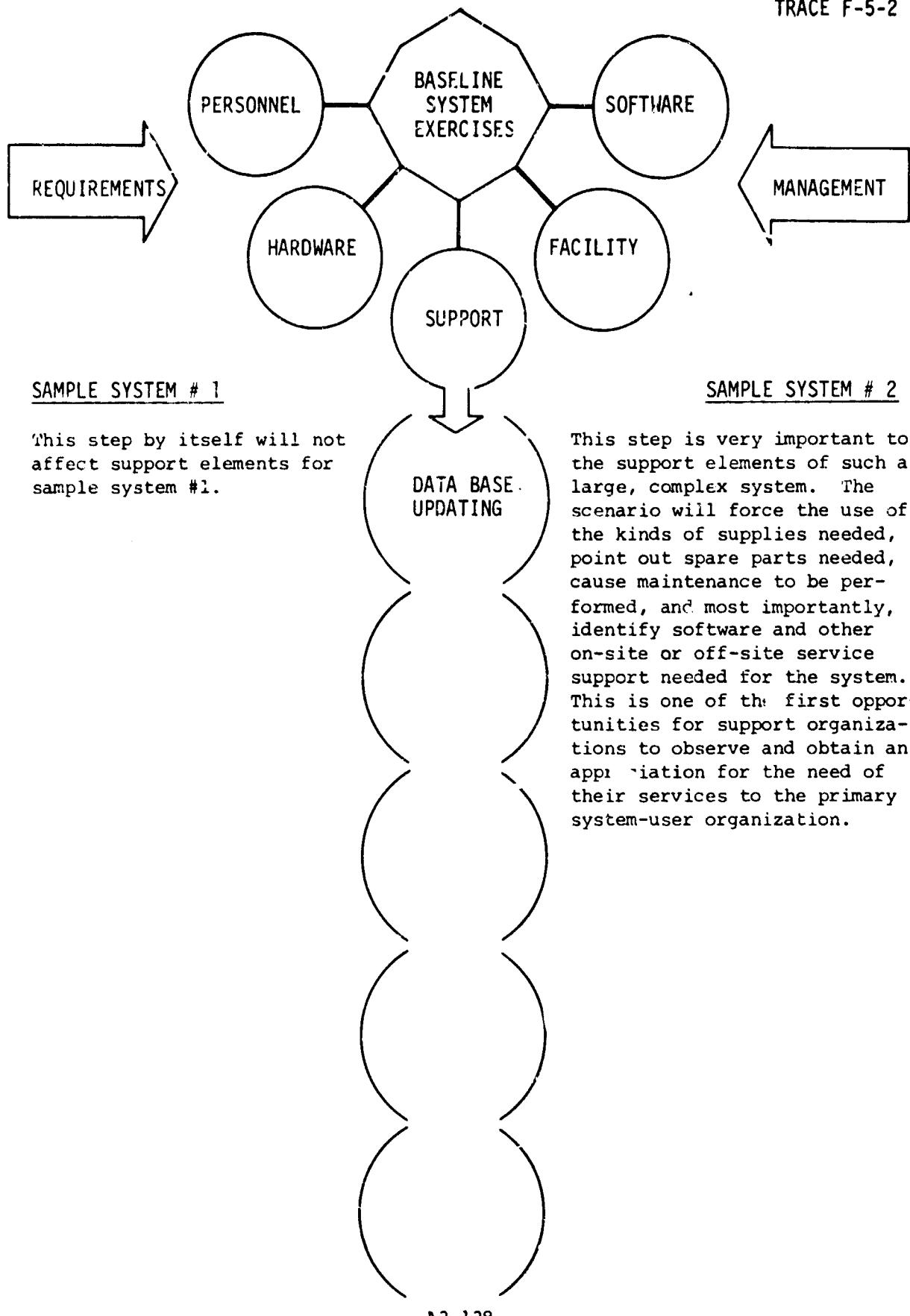
This will not affect the facility elements to a great extent except to record recommended modifications to engineering support personnel.



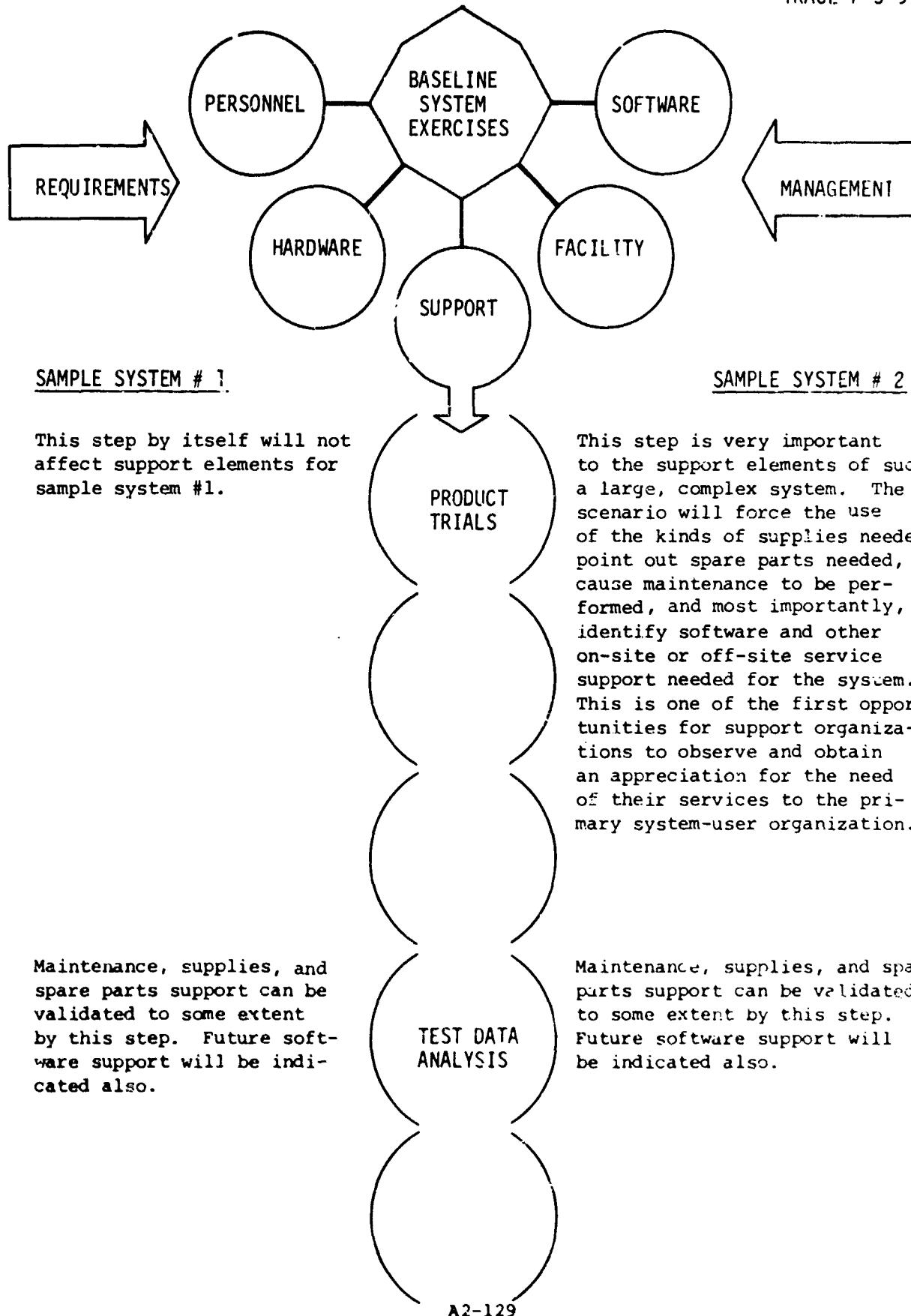


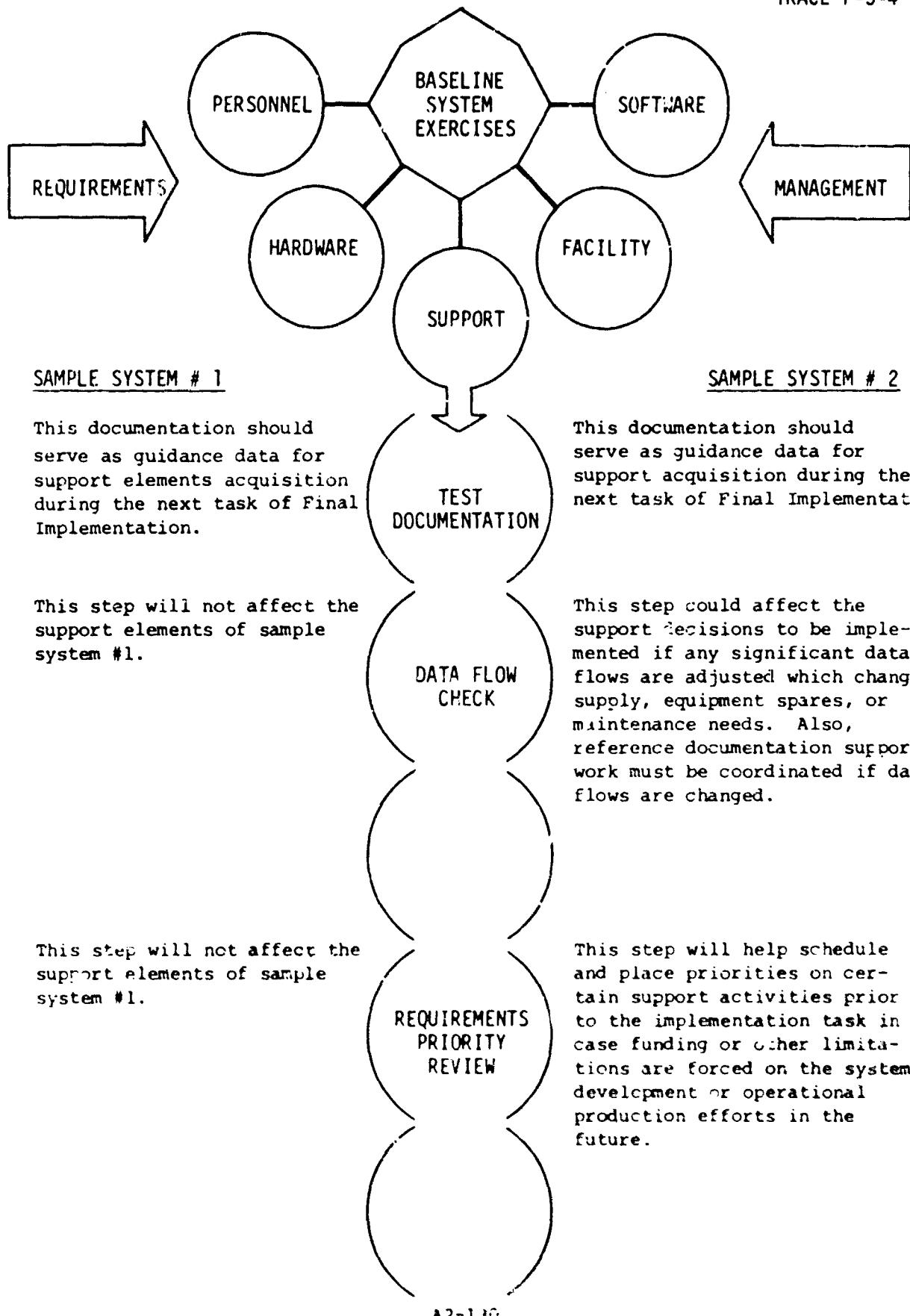


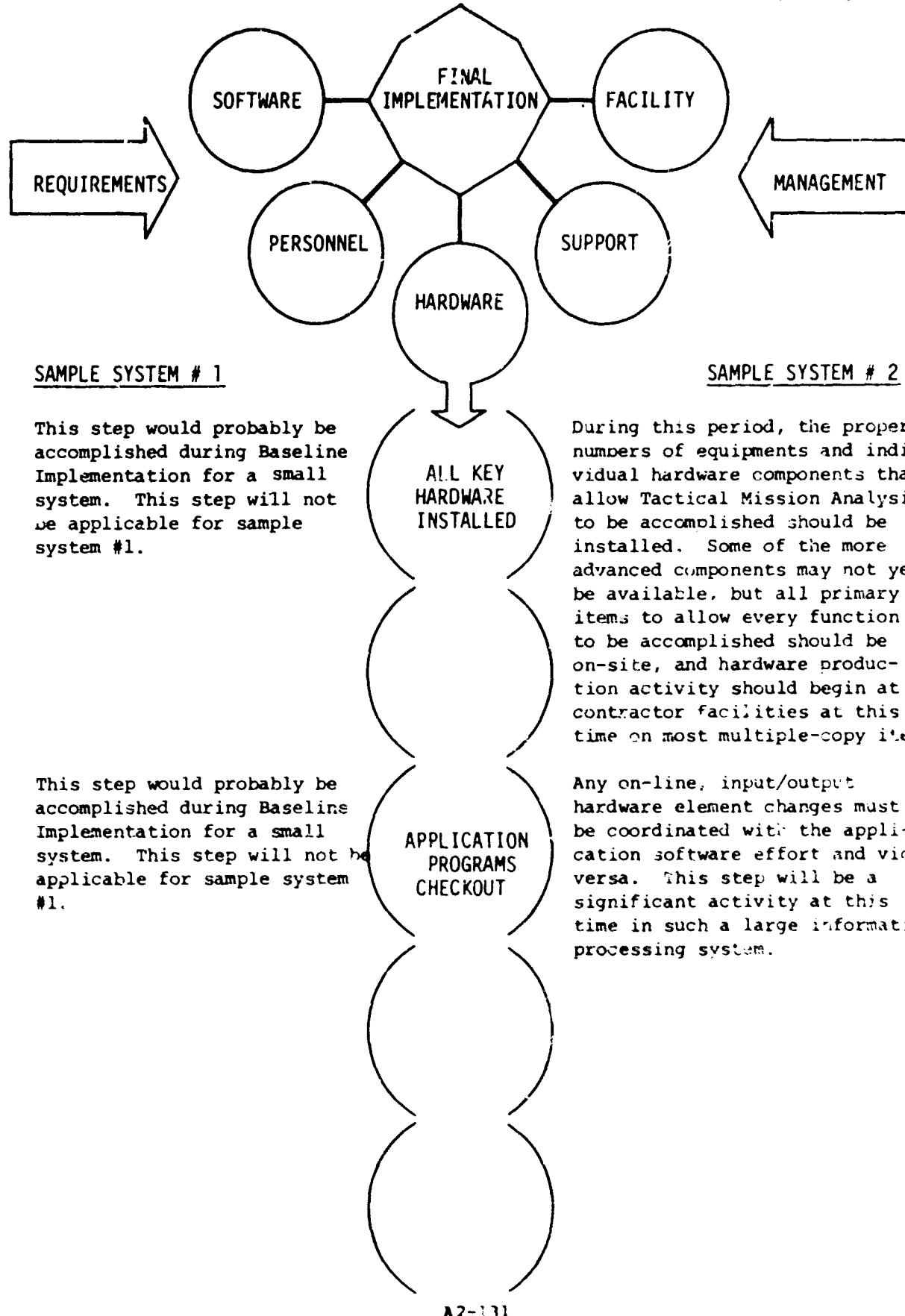
TRACE F-5-2

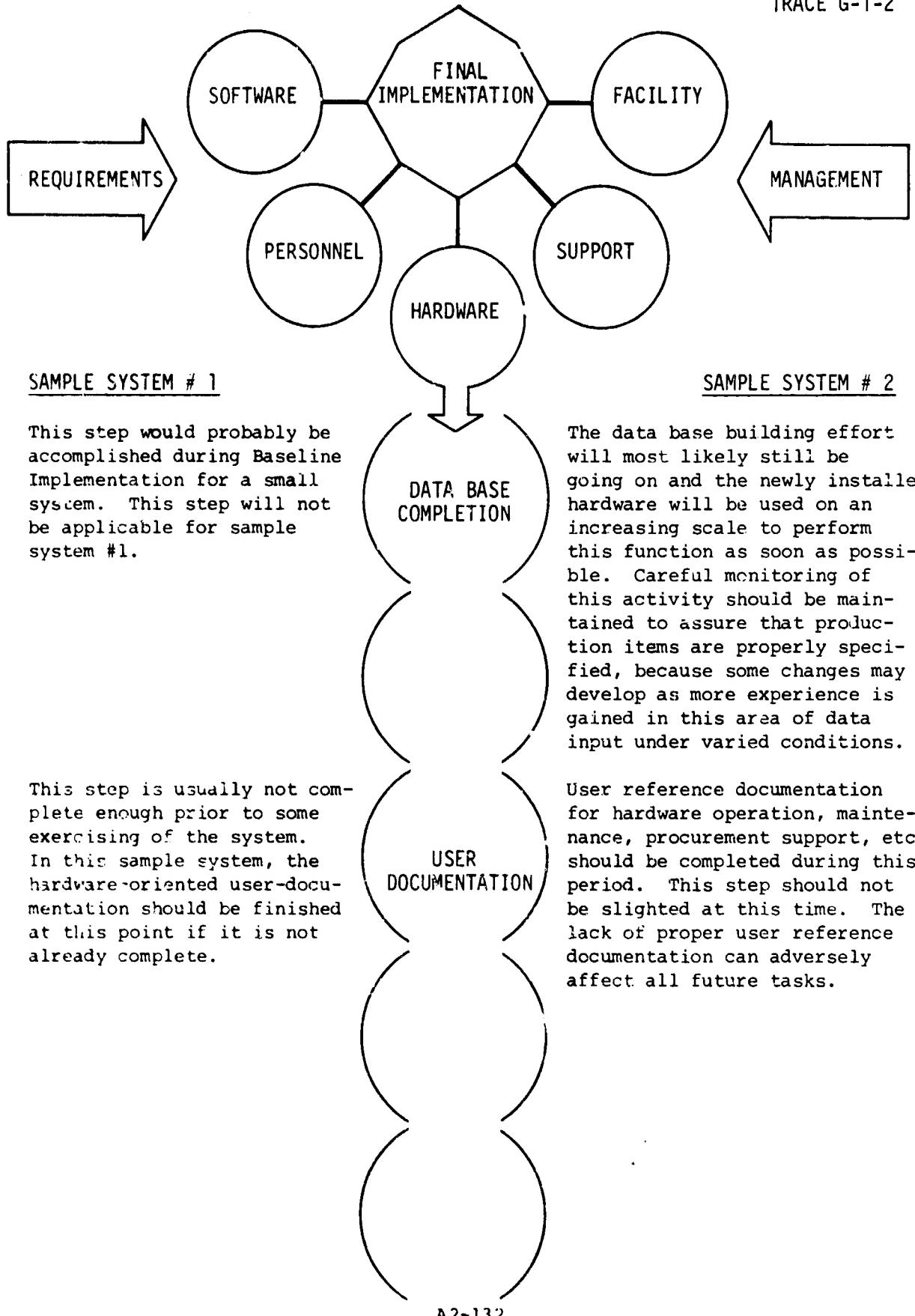


A2-128

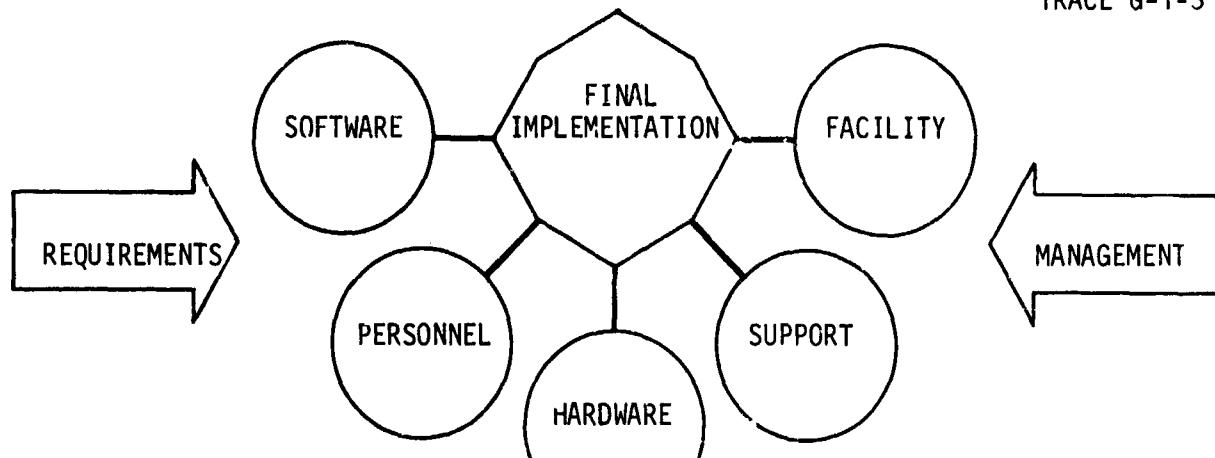








TRACE G-1-3



SAMPLE SYSTEM # 1

Any expansion plans should be identified by now if they are to be implemented between Baseline Exercises and Operational Acceptance Tasks. In this sample system, more consoles might be added, but the computer hardware and software support would have to be re-examined.

This step is not applicable as far as hardware elements are concerned for sample system #1.

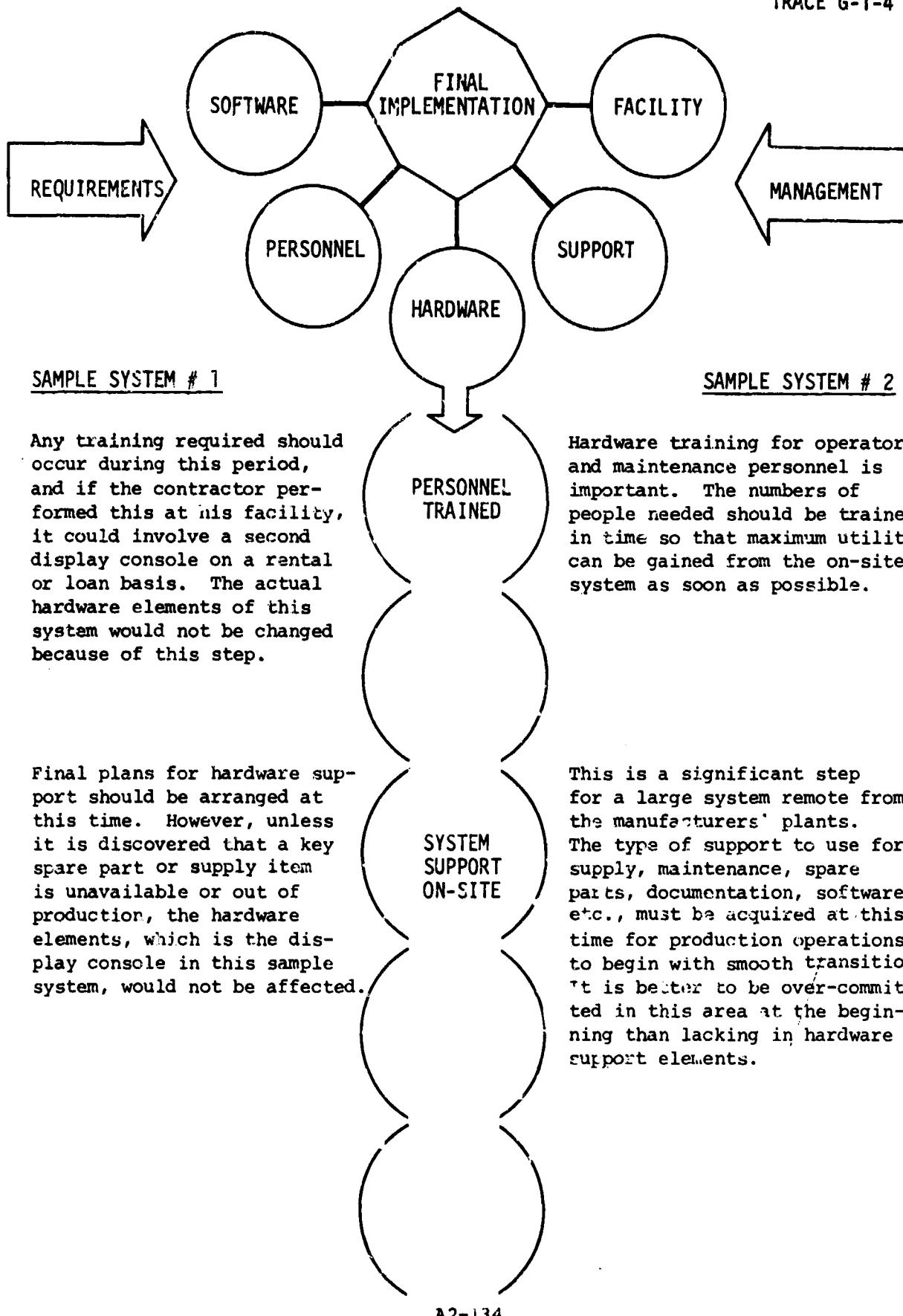
SAMPLE SYSTEM # 2

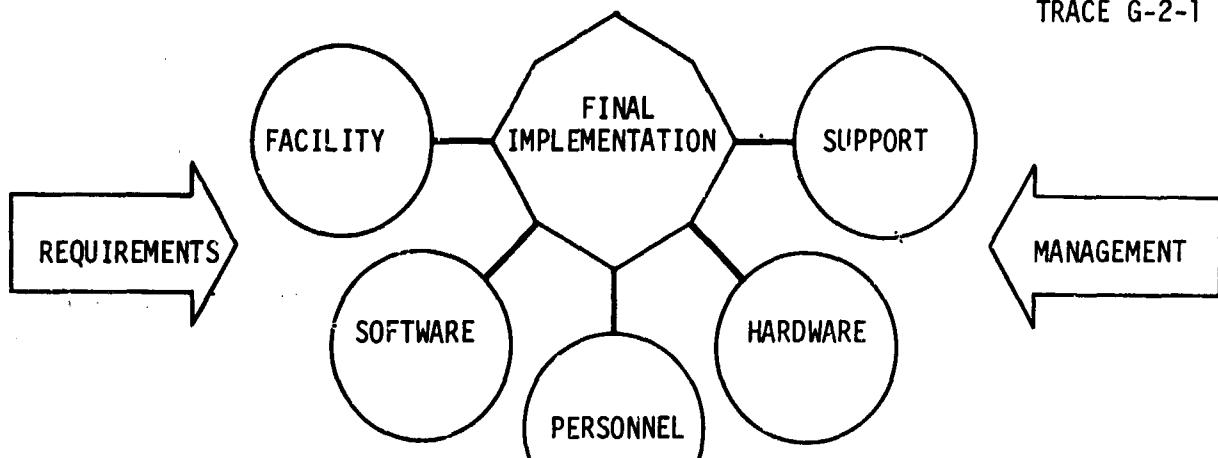
Any system expansion plans should be integrated into hardware production changes at this time if possible. Often, these expansion actions must take the place of replacement or additional hardware terminals in a system such as this. Then, the computer components supporting the terminals must be carefully analyzed for capability. Other functional hardware that is off-line can come in anytime.

This step is necessary if the total inventory of hardware is to be efficiently used as soon as possible. Much equipment is wasted due to improper facility preparations to house the items so that the specified data flow can be implemented.



A2-133



SAMPLE SYSTEM # 1

This step will not be applicable for sample system #1, because the effort that would be done here was completed during Baseline Implementation

SAMPLE SYSTEM # 2

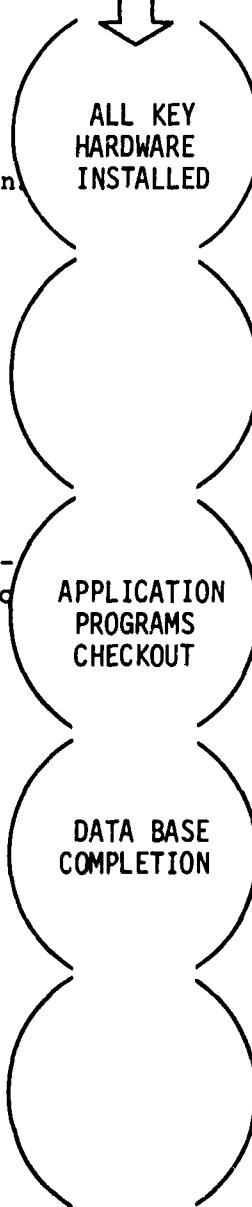
This affects personnel staffing and all support personnel directly. As soon as all the system hardware is installed and uses are made of it, the operational staff begins improving their coordinated activity and discovering new methods of working as an effective team. Training needs and support element needs are all decreased by the increase in competence of the operating staff.

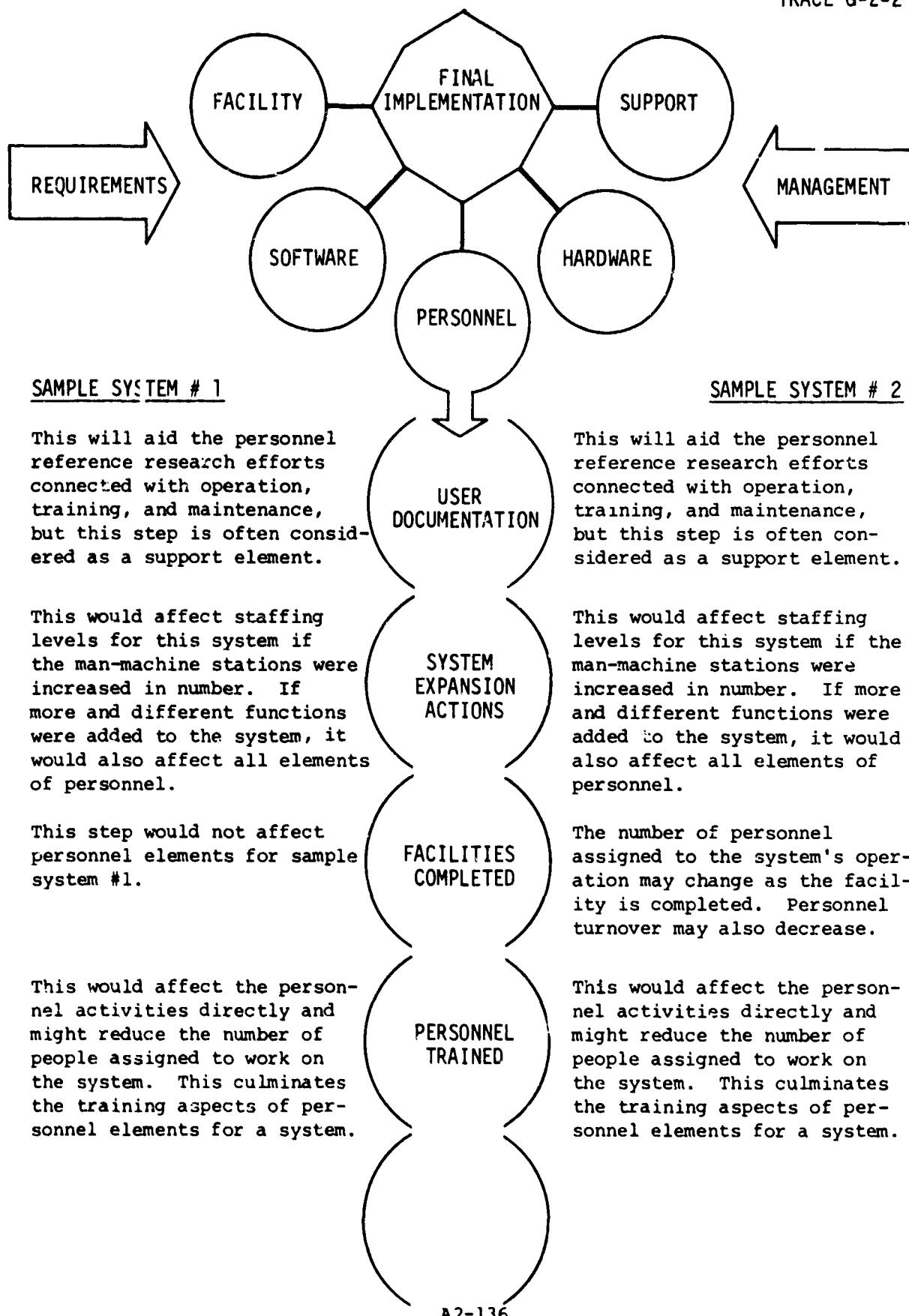
Even though the hardware is all installed, there frequently is more of this activity to accomplish. If so, this will require some training and personnel coordination at a minimum.

Even though the hardware is all installed, there frequently is more of this activity to accomplish. If so, this will require some training and personnel coordination at a minimum.

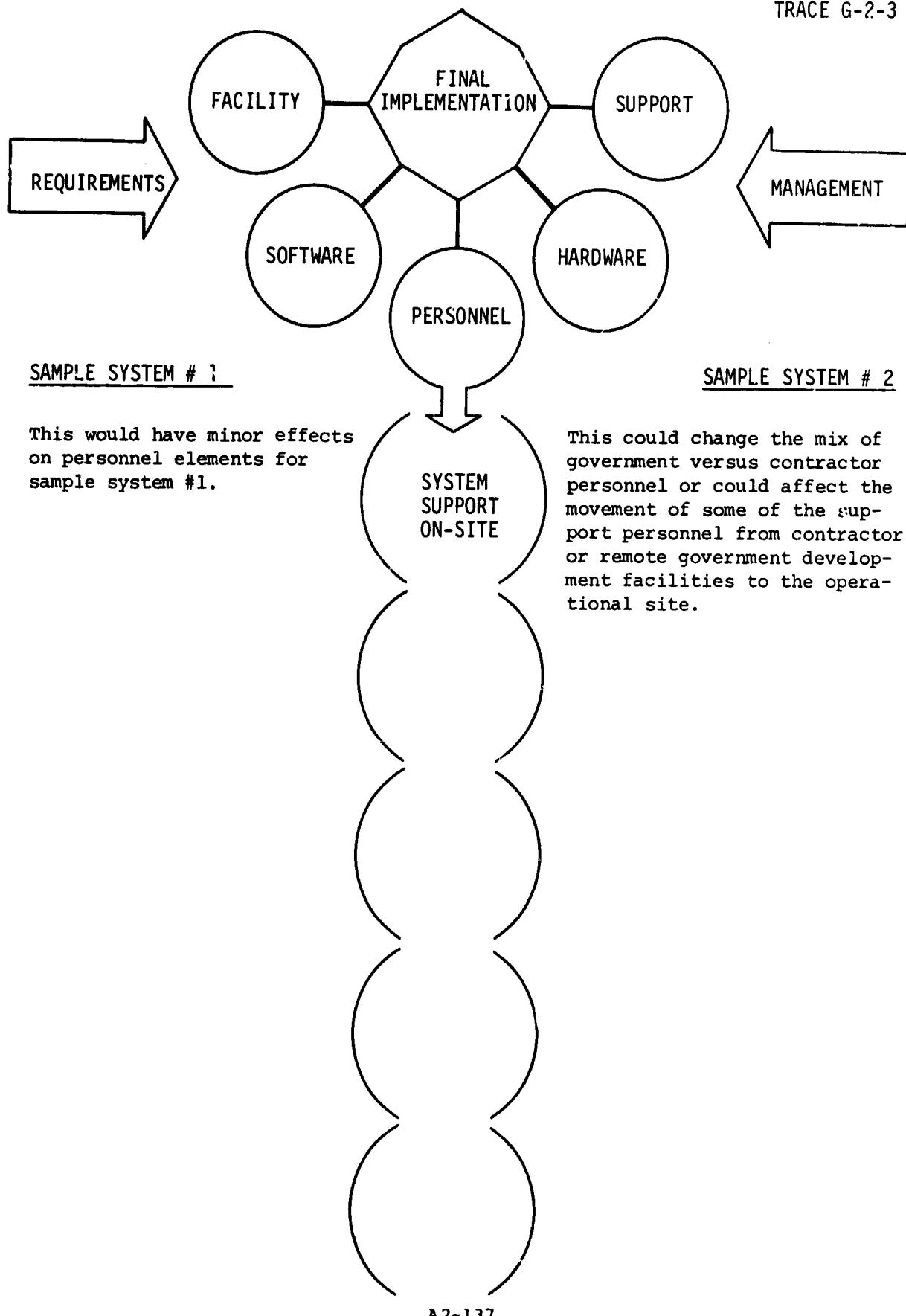
This may cause a decrease in manning requirements from earlier tasks if this effort is finished during Final Implementation.

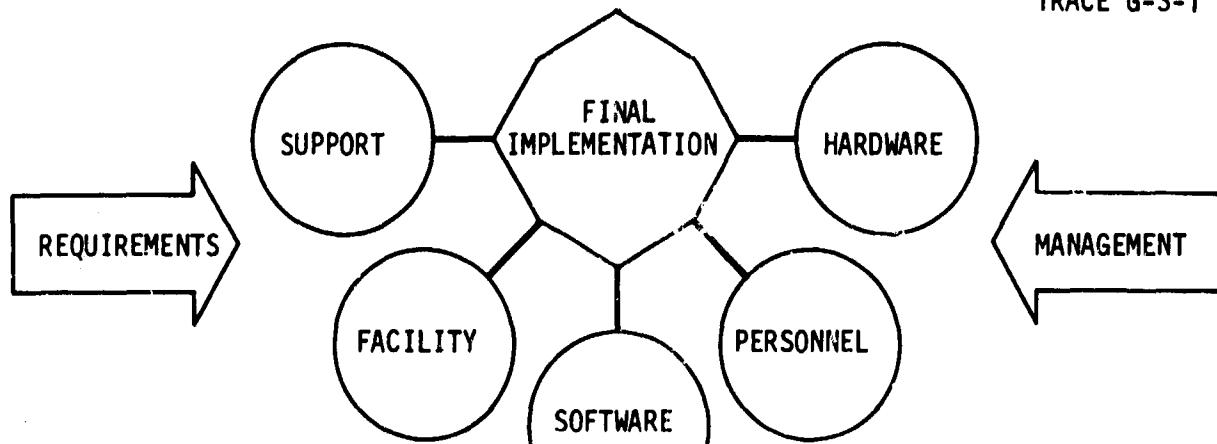
This may cause a decrease in manning requirements from earlier tasks if this effort is finished during Final Implementation.





TRACE G-2-3



SAMPLE SYSTEM # 1

This step is not applicable for sample system #1 since all the equipment was installed during Baseline Implementation.

This step may be a continuing one and directly affects the resultant software capability.

This step helps check out the application software completely and confidently.

This step aids in any software modifications or additions to the application program library. It is very important to have a complete and accurate product from this step for all software.

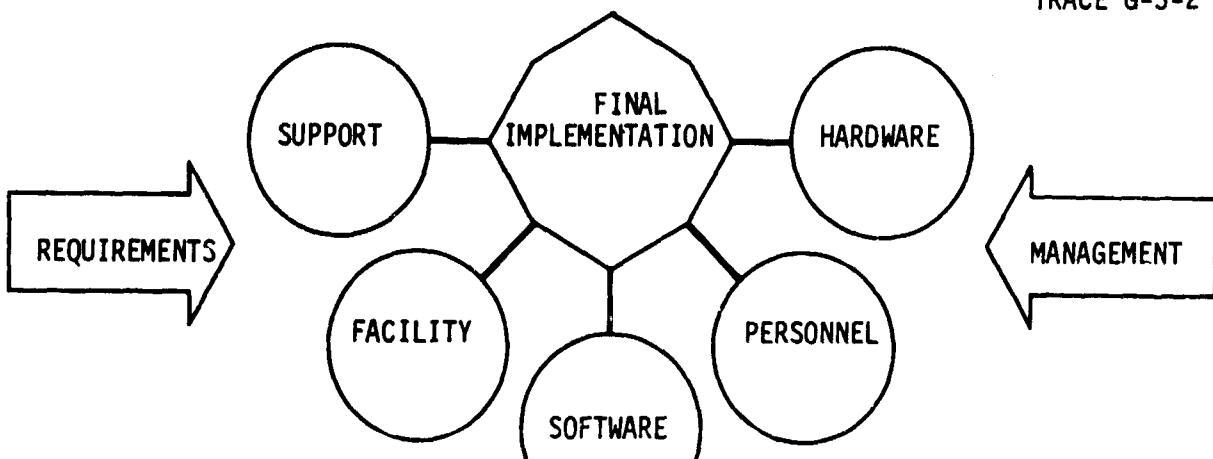
SAMPLE SYSTEM # 2

The application software can only be checked out after all representative on-line equipments are installed unless the EDP system is duplicated elsewhere. The file management system can only be validated in this same manner.

This step may be a continuing one and directly affects the resultant software capability.

This step helps check out the application software completely and confidently. It is also necessary for checking the file management system programs.

This step aids in any software modifications or additions to the application program library. It is very important to have a complete and accurate product from this step for all software.

SAMPLE SYSTEM # 1

This may affect the application programs needed. The computer support component in this sample system should have its system software re-evaluated if this step is taken.

This step will not affect software elements for sample system #1.

This step will be better performed if the application programs are completed; however, the software elements will not be affected by this unless the personnel who are trained are to be working on new application programs or changes to old ones.

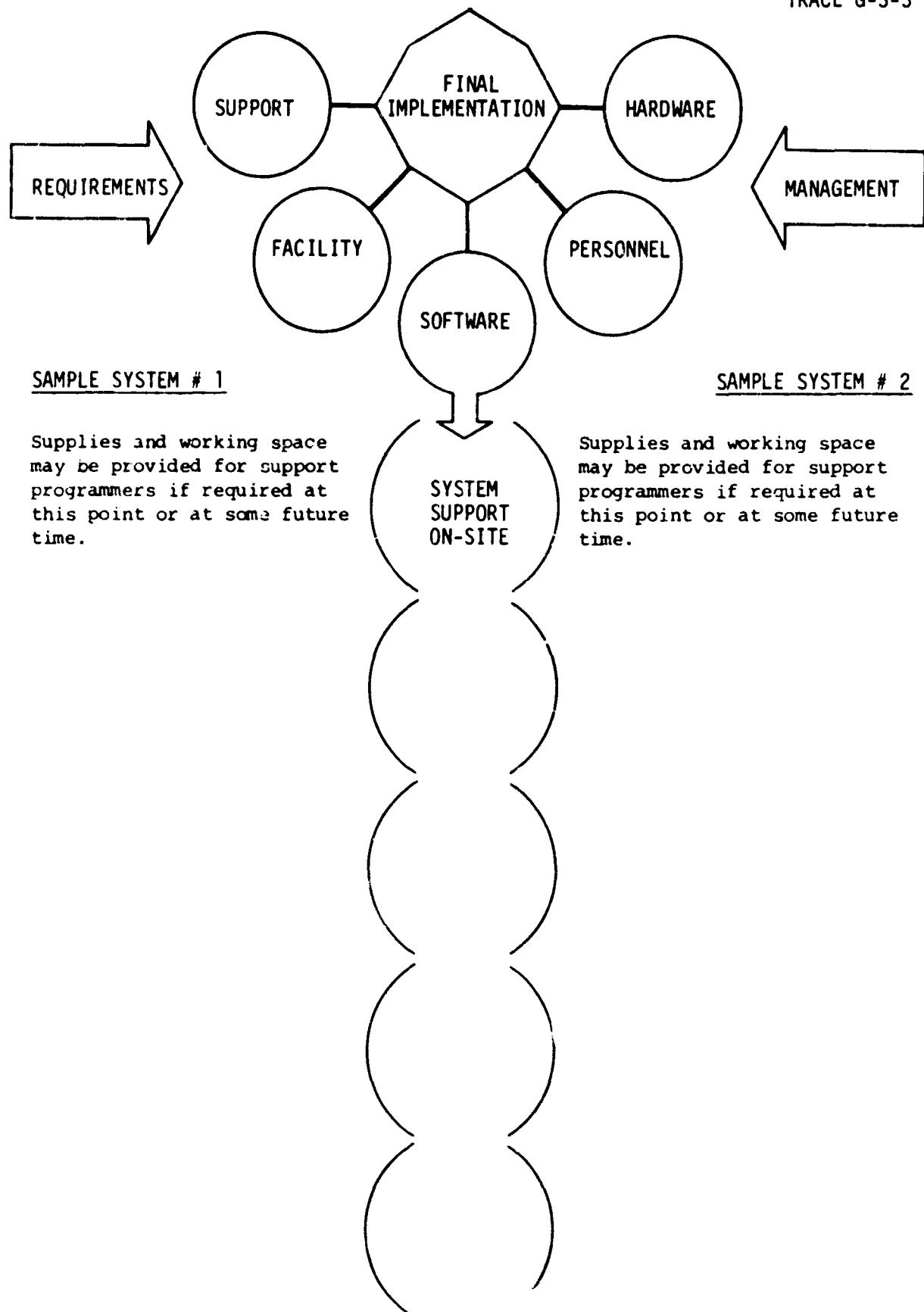
SAMPLE SYSTEM # 2

This may affect the application programs needed. The computer support component in this sample system should have its system software re-evaluated if this step is taken. Other off-line equipments may be added or modified also. If so, the data flows should be re-examined to assure that the on-line and batch data processing support needs are the same. If not, new software may be needed.

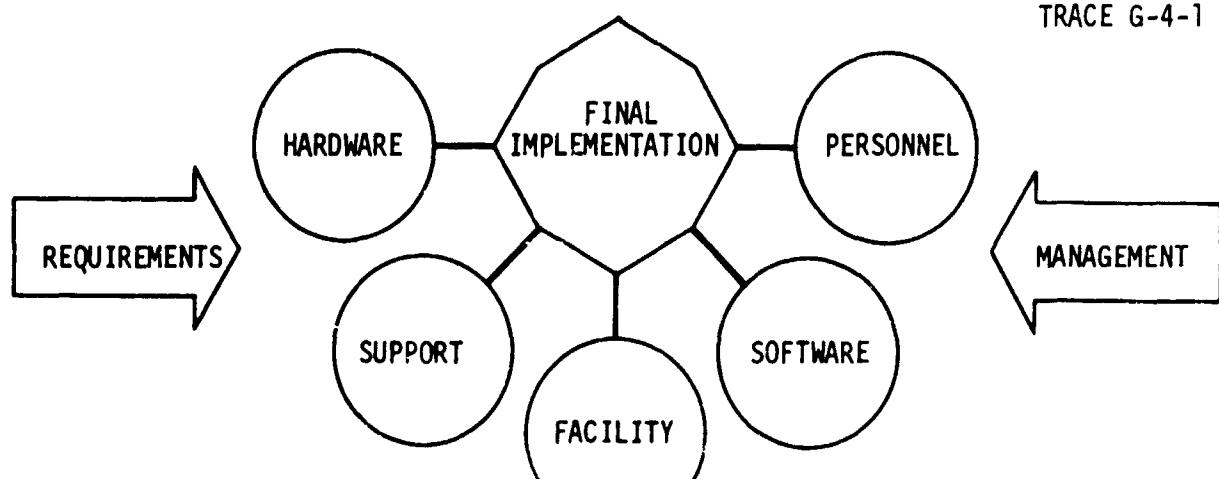
This step will not affect software elements for sample system #1.

This step will be better performed if the application programs are completed; however, the software elements will not be affected by this unless the personnel who are trained are to be working on new application programs or changes to old ones. Sometimes, improvements in system software can be planned as personnel become more available to implement them.

TRACE G-3-3



TRACE G-4-1



SAMPLE SYSTEM # 1

This step will not be applicable for sample system #1.

SAMPLE SYSTEM # 2

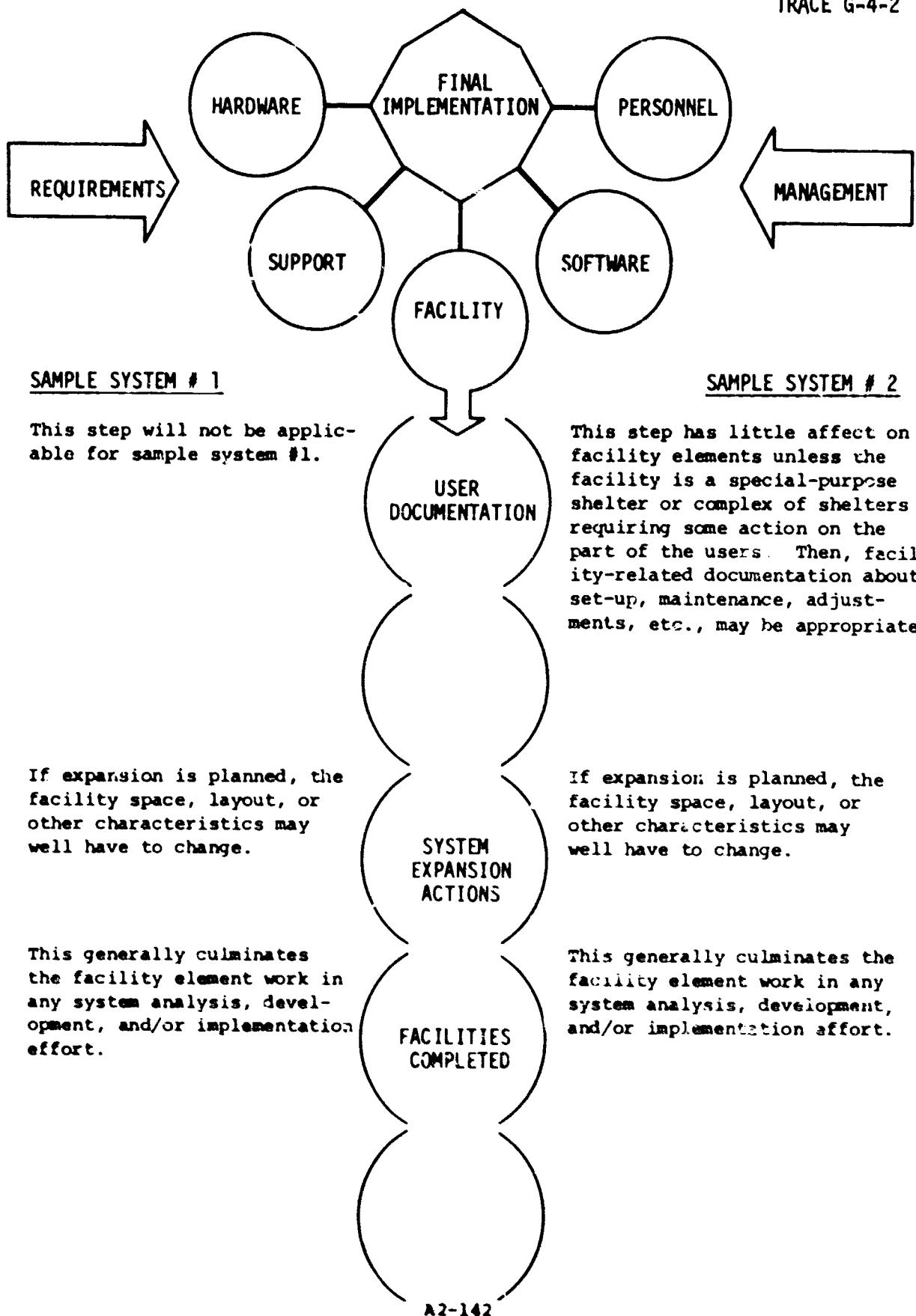
Final facility finishing work or decoration may be completed. Also the cable ducting, safety exits, and telephone lines can be finalized if not previously done. Sometimes special, large equipment requires extra-large openings that are sealed after the hardware has been installed.

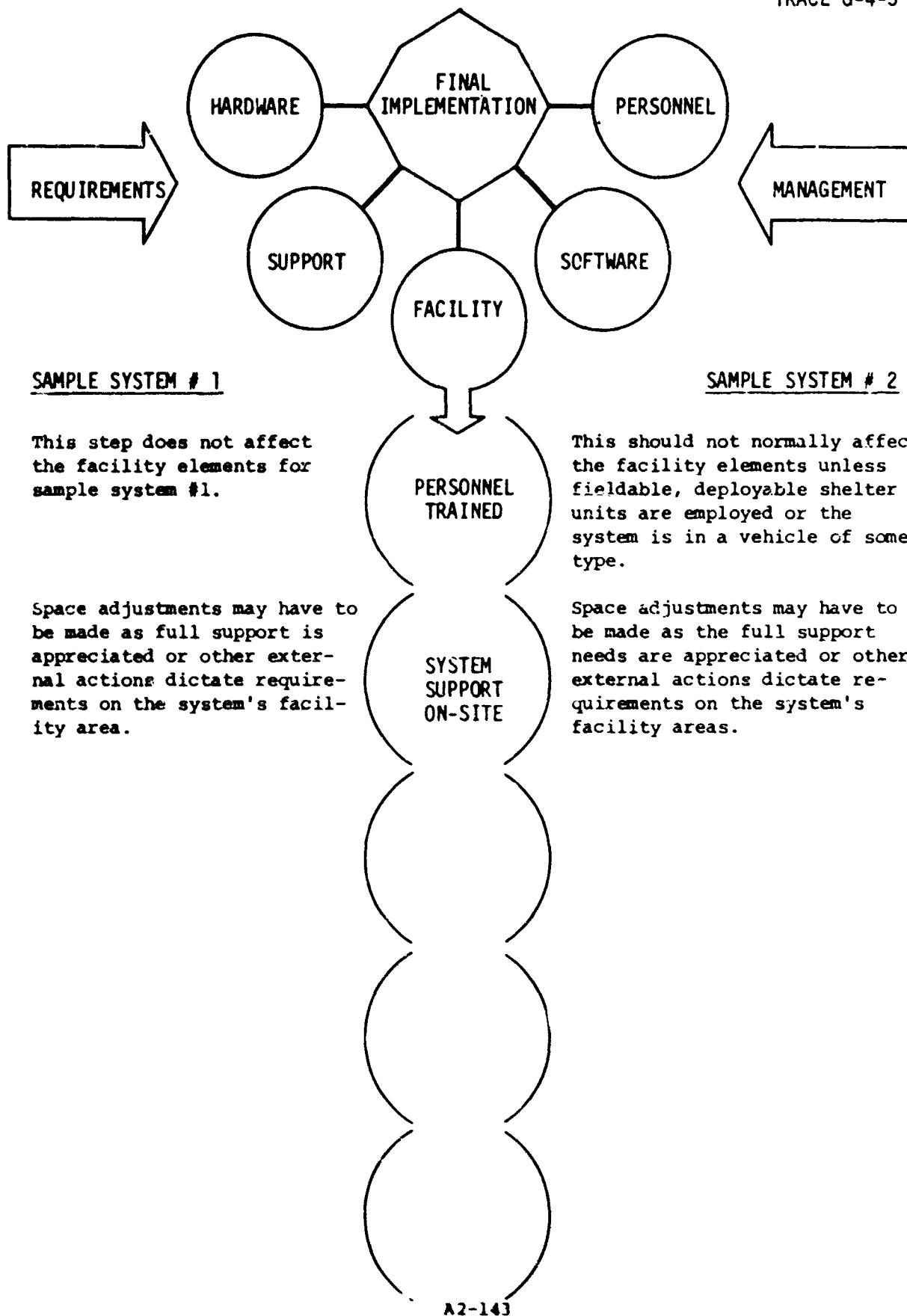
This step will not be applicable for sample system #1.

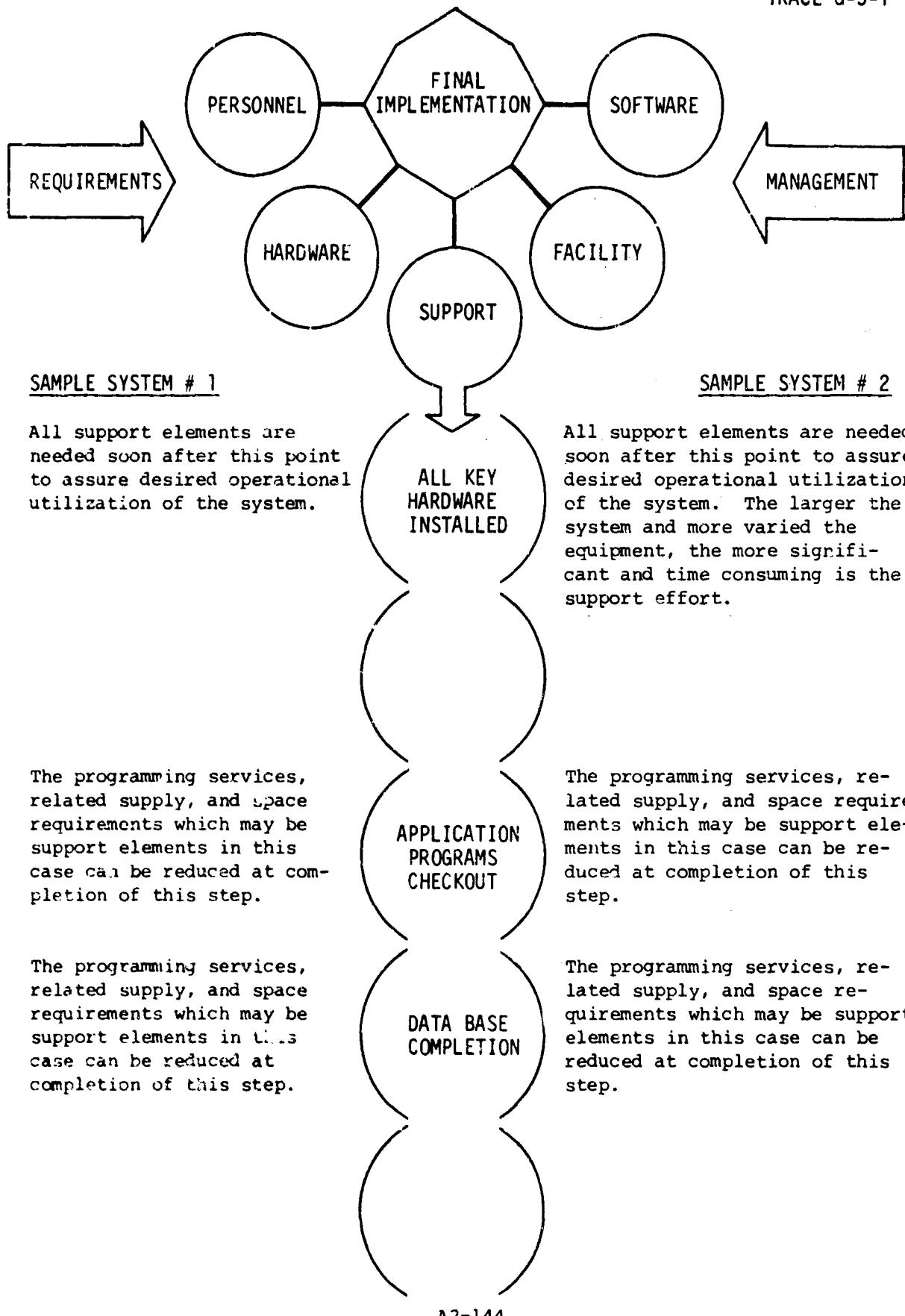
This step will not affect the facility elements for sample system #2, unless completion of this effort signals the fabrication of the housing for the system. This might be the case for shelterized, tactical systems that are developed in fixed facilities--then fielded.

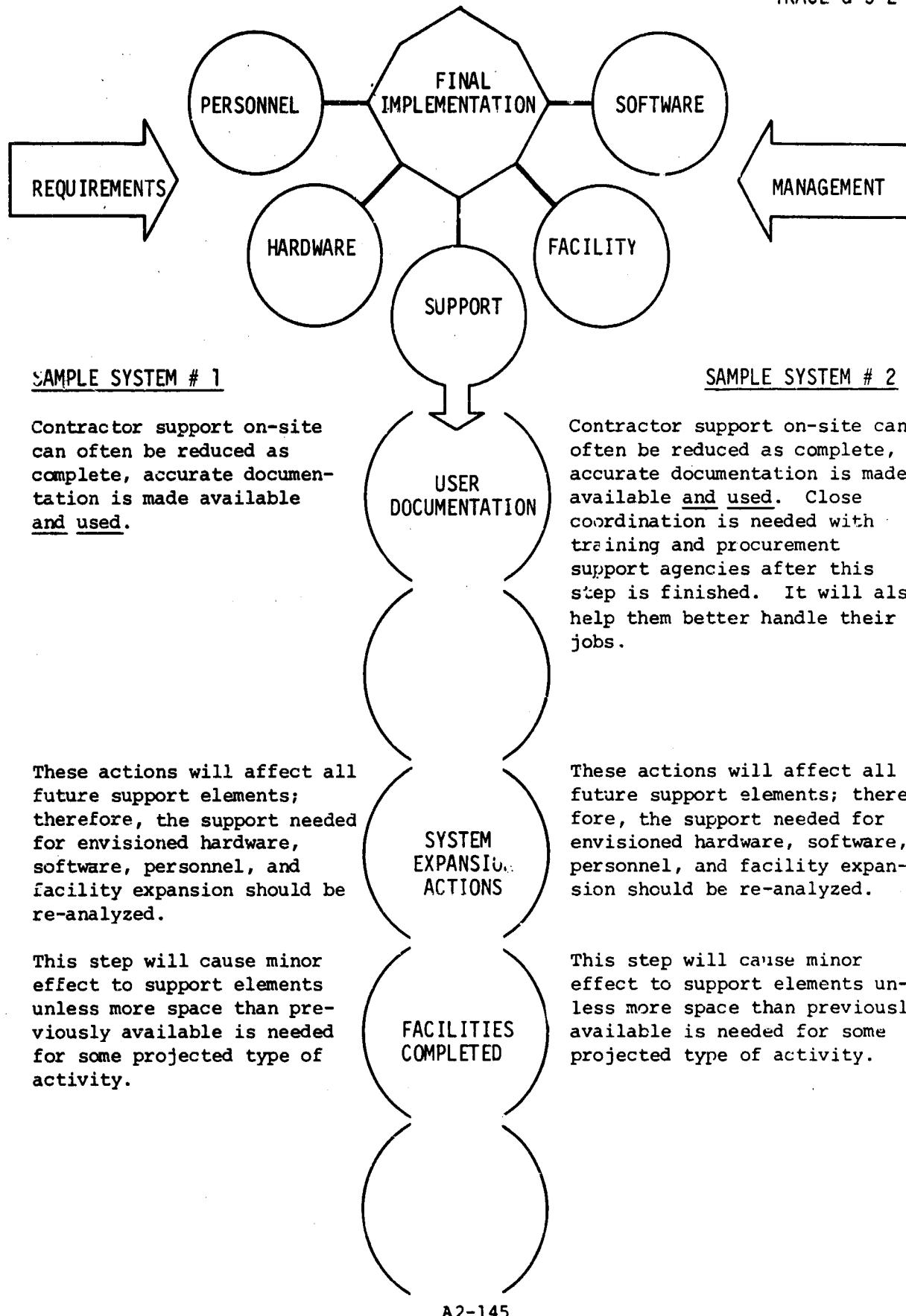
This step will not be applicable for sample system #1.

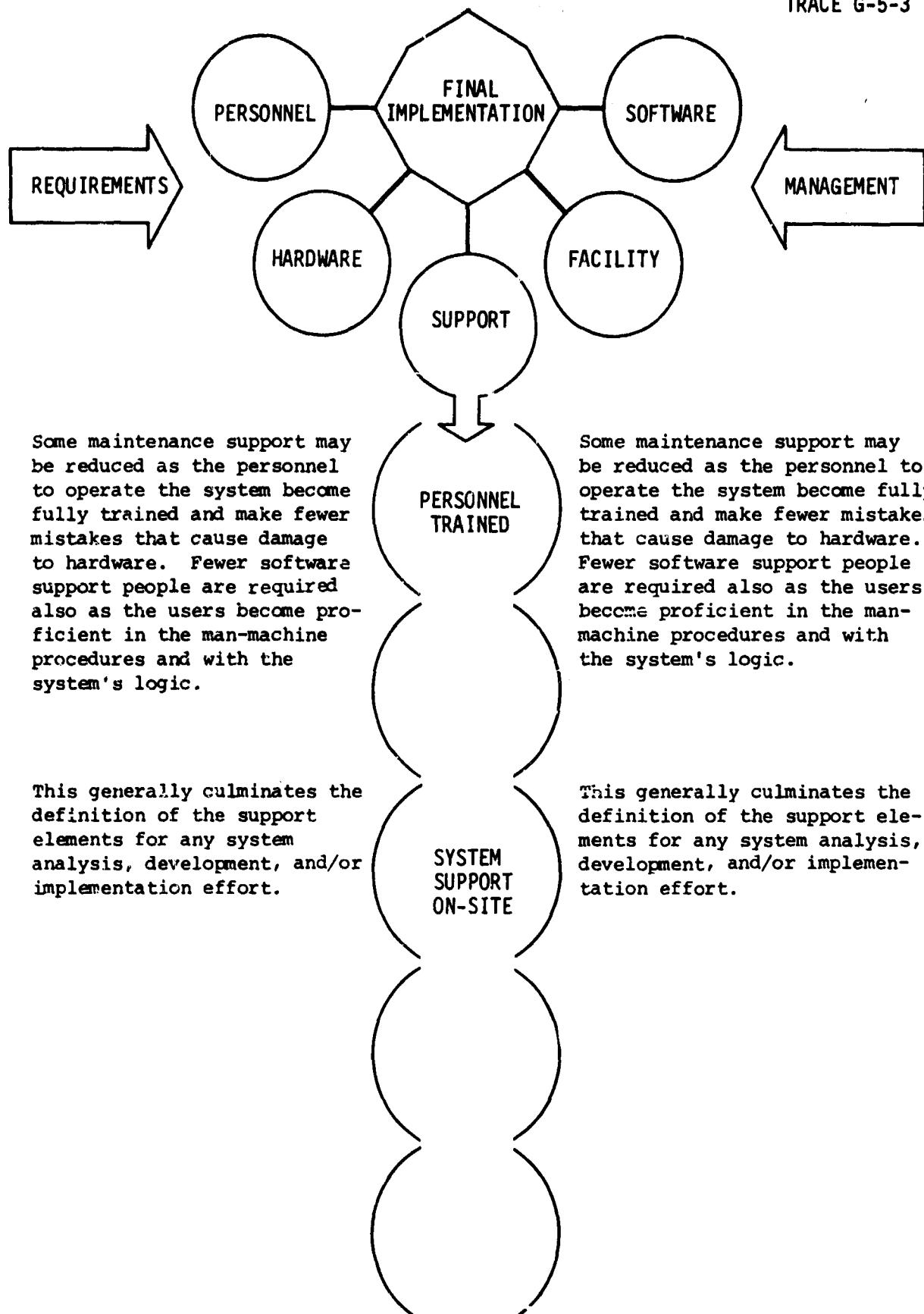
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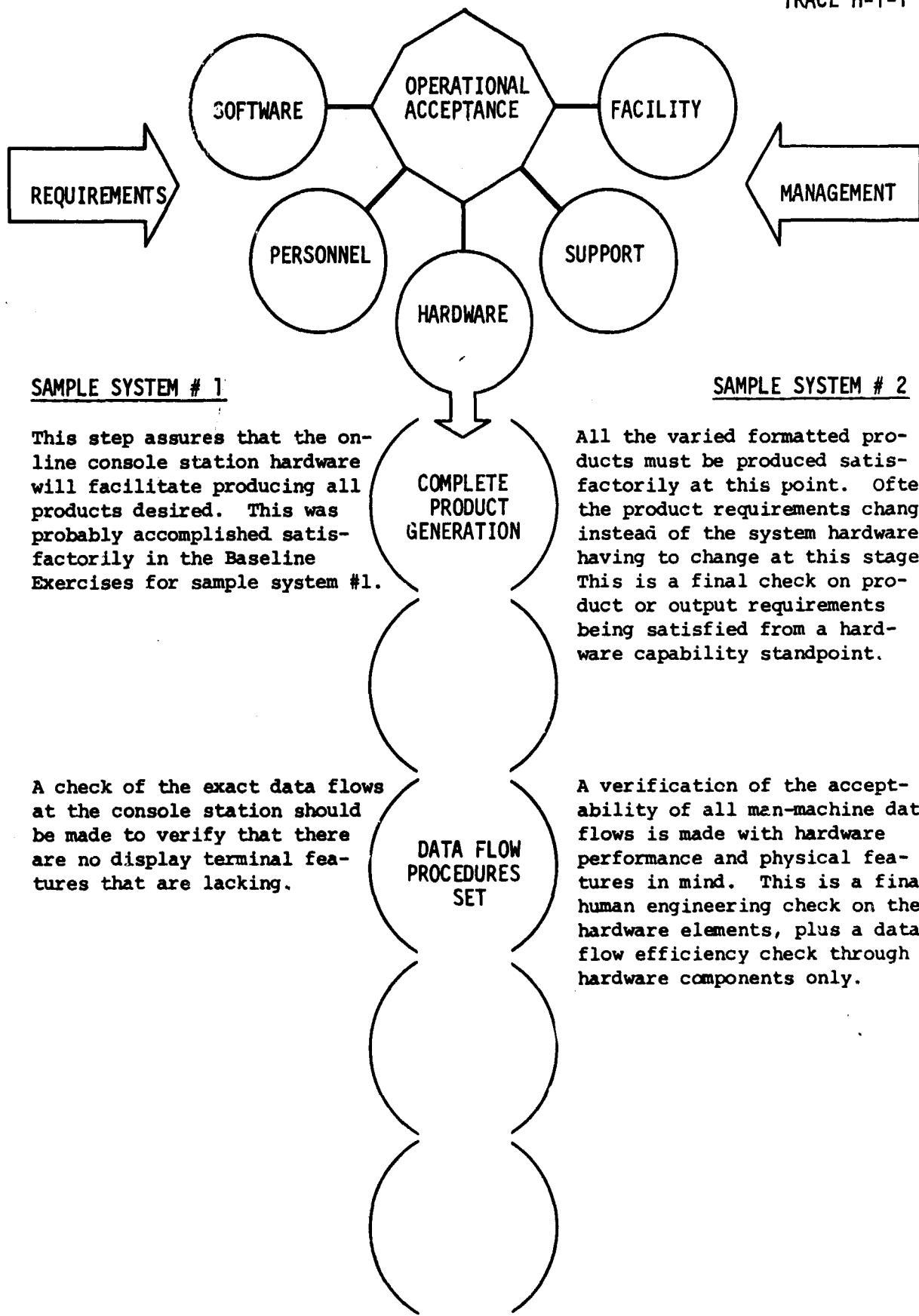


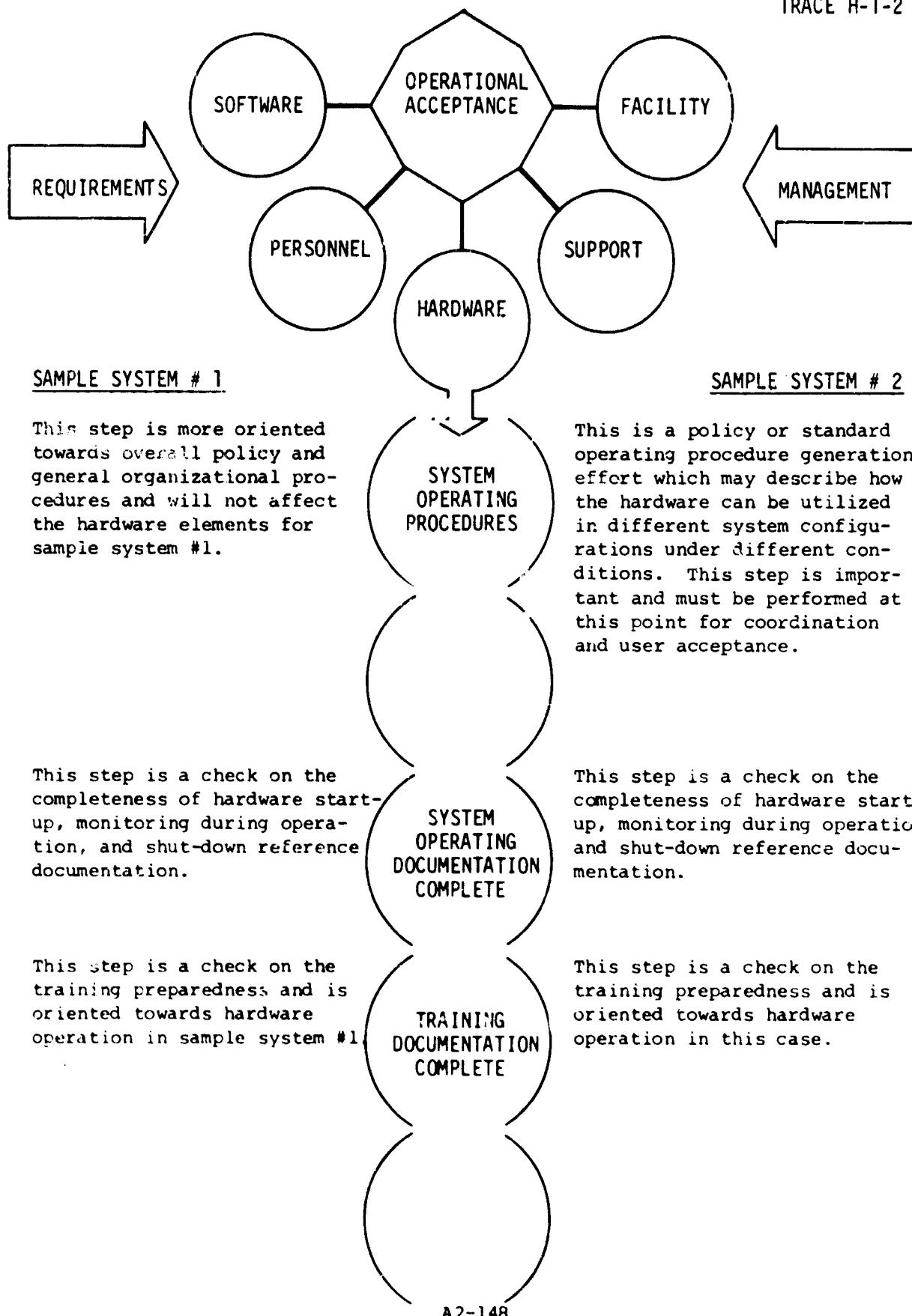
Some maintenance support may be reduced as the personnel to operate the system become fully trained and make fewer mistakes that cause damage to hardware. Fewer software support people are required also as the users become proficient in the man-machine procedures and with the system's logic.

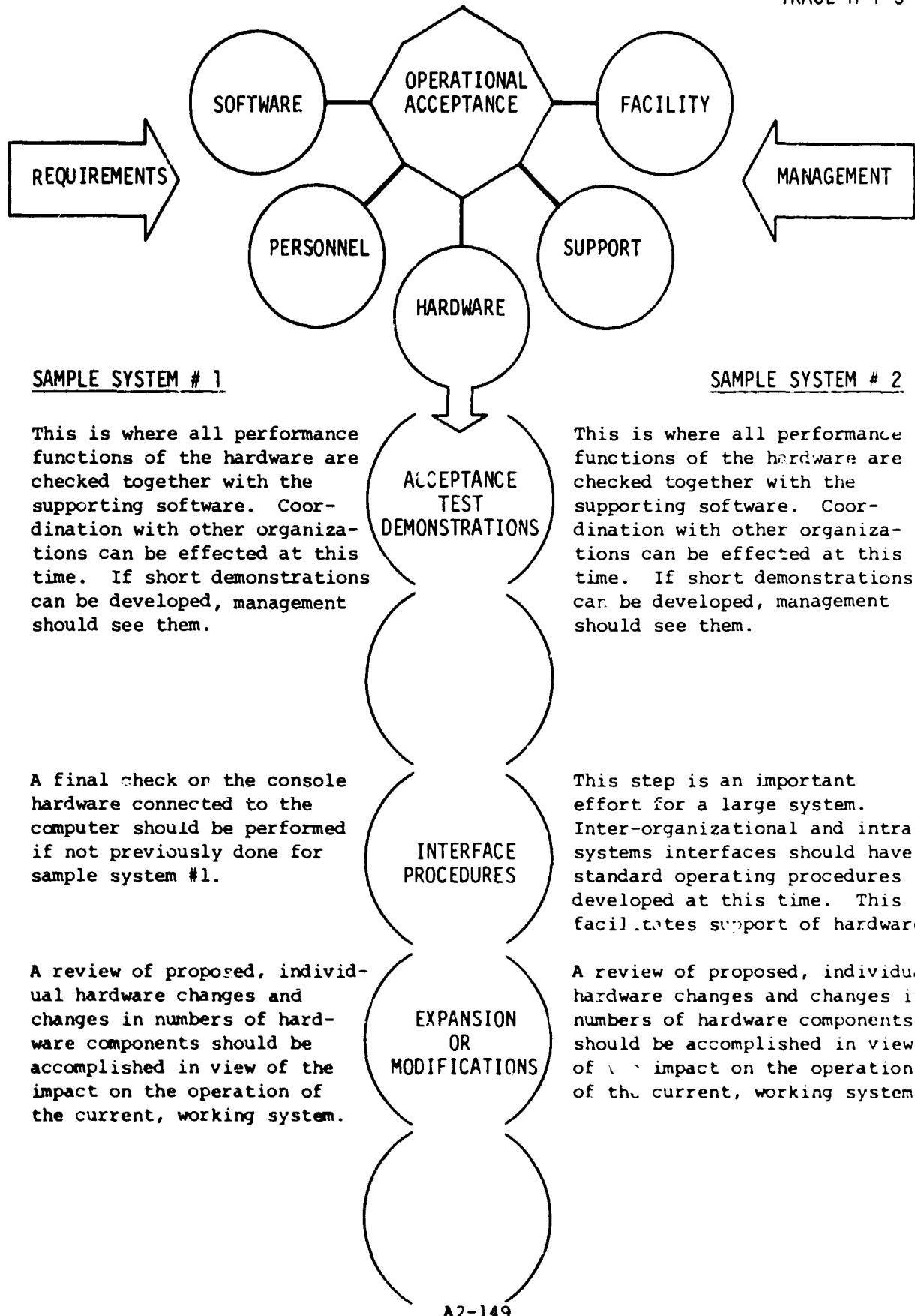
This generally culminates the definition of the support elements for any system analysis, development, and/or implementation effort.

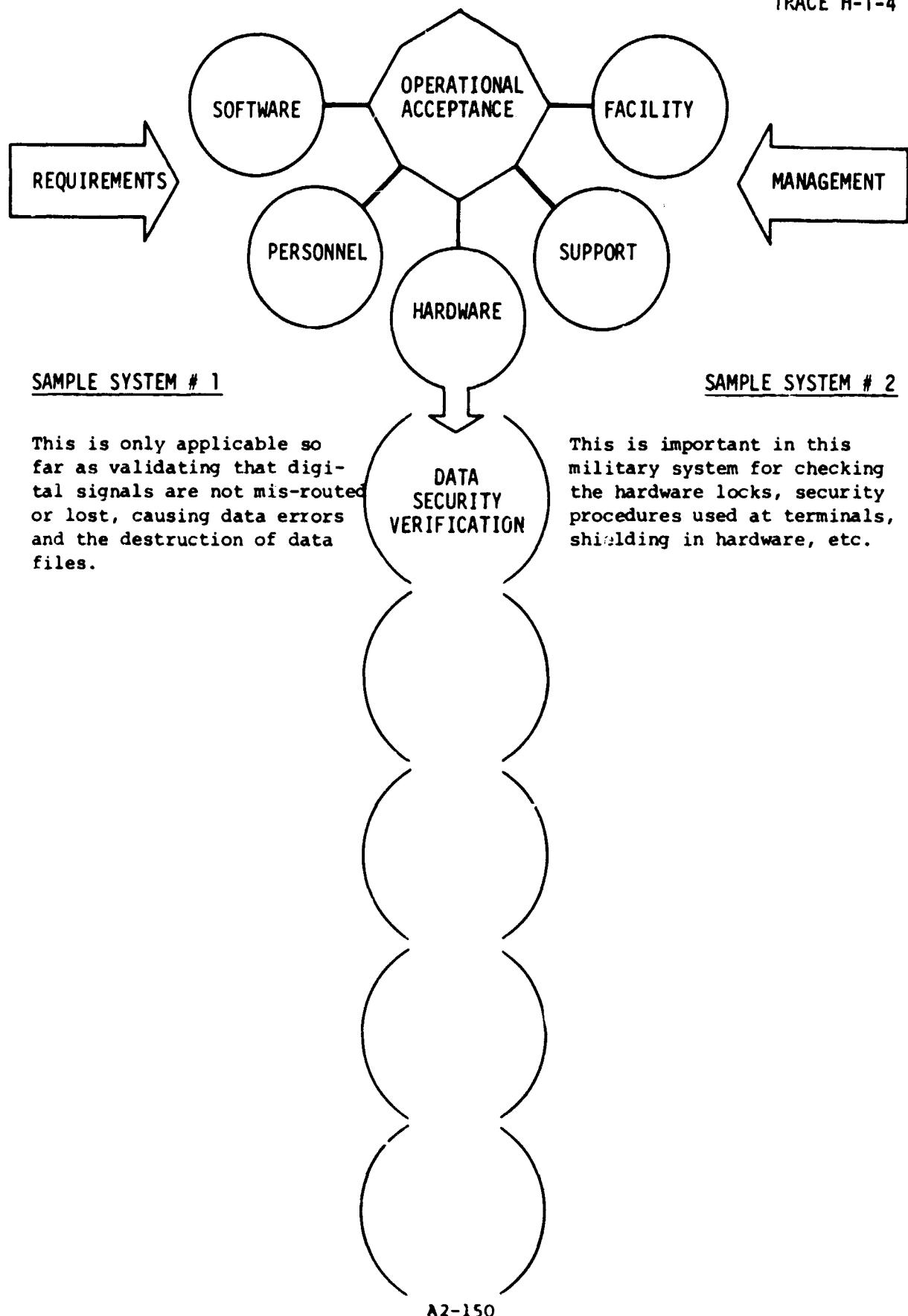
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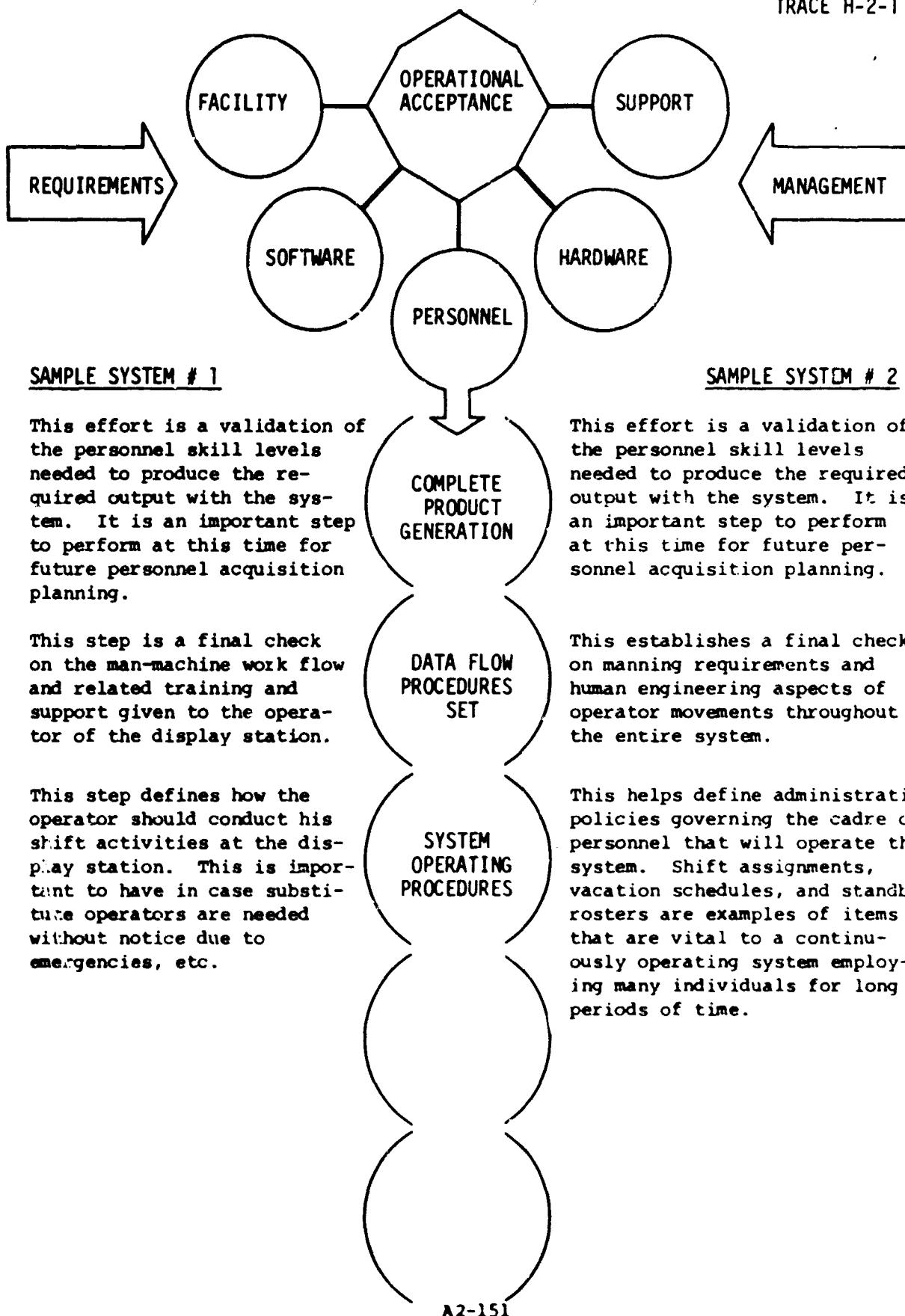
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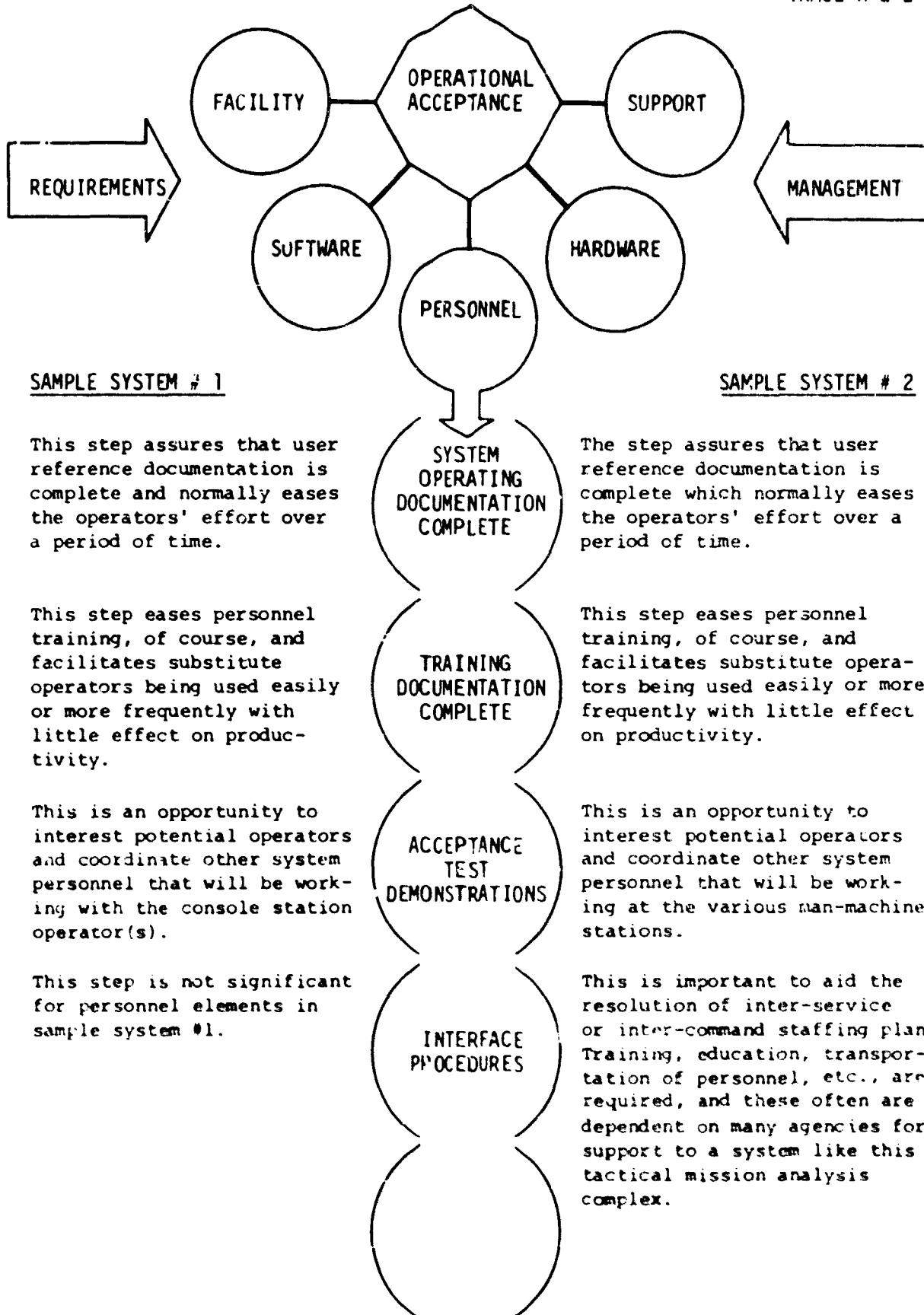




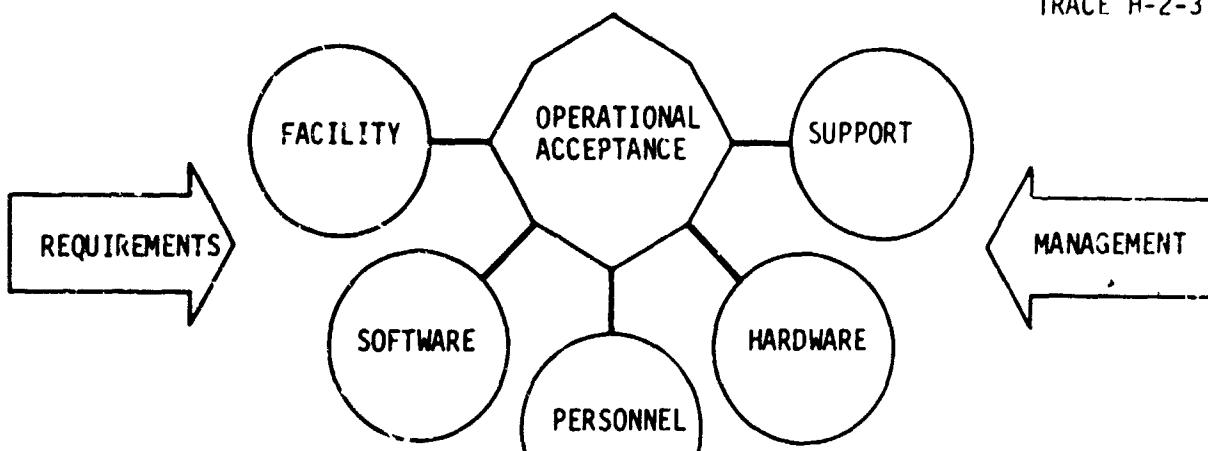








TRACE H-2-3



SAMPLE SYSTEM # 1

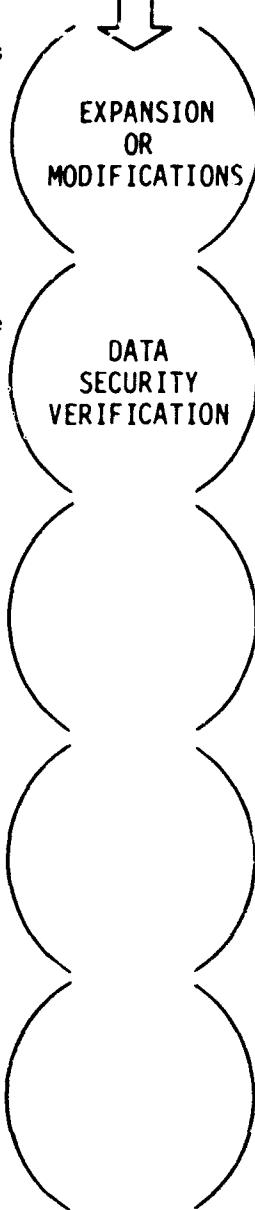
Future increases or decreases in operator, maintenance, and/or supply personnel may be indicated at this point.

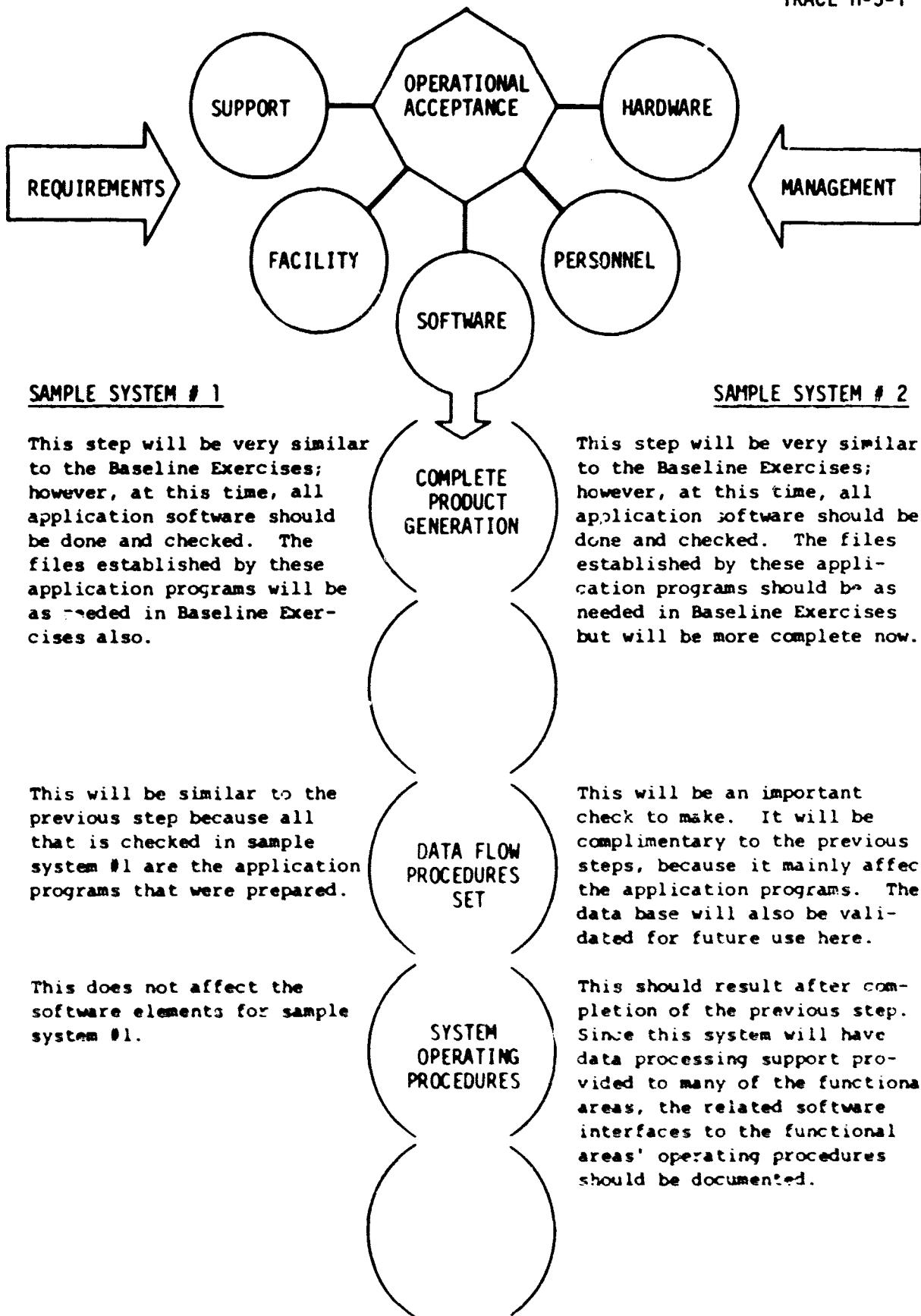
This is not applicable to personnel elements for sample system #1.

SAMPLE SYSTEM # 2

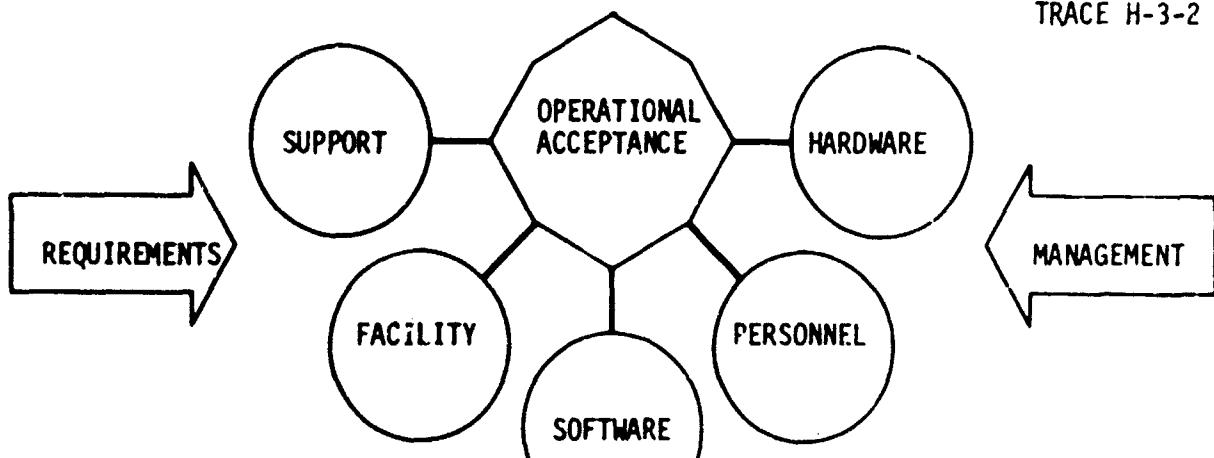
Future increases or decreases in operator, maintenance, and/or supply personnel may be indicated at this point.

Personnel check-in, console sign on and cff, and administrative controls must be verified as adequate to maintain compliance with security regulations.





TRACE H-3-2



SAMPLE SYSTEM # 1

This step does not affect the software elements for sample system #1.

SAMPLE SYSTEM # 2

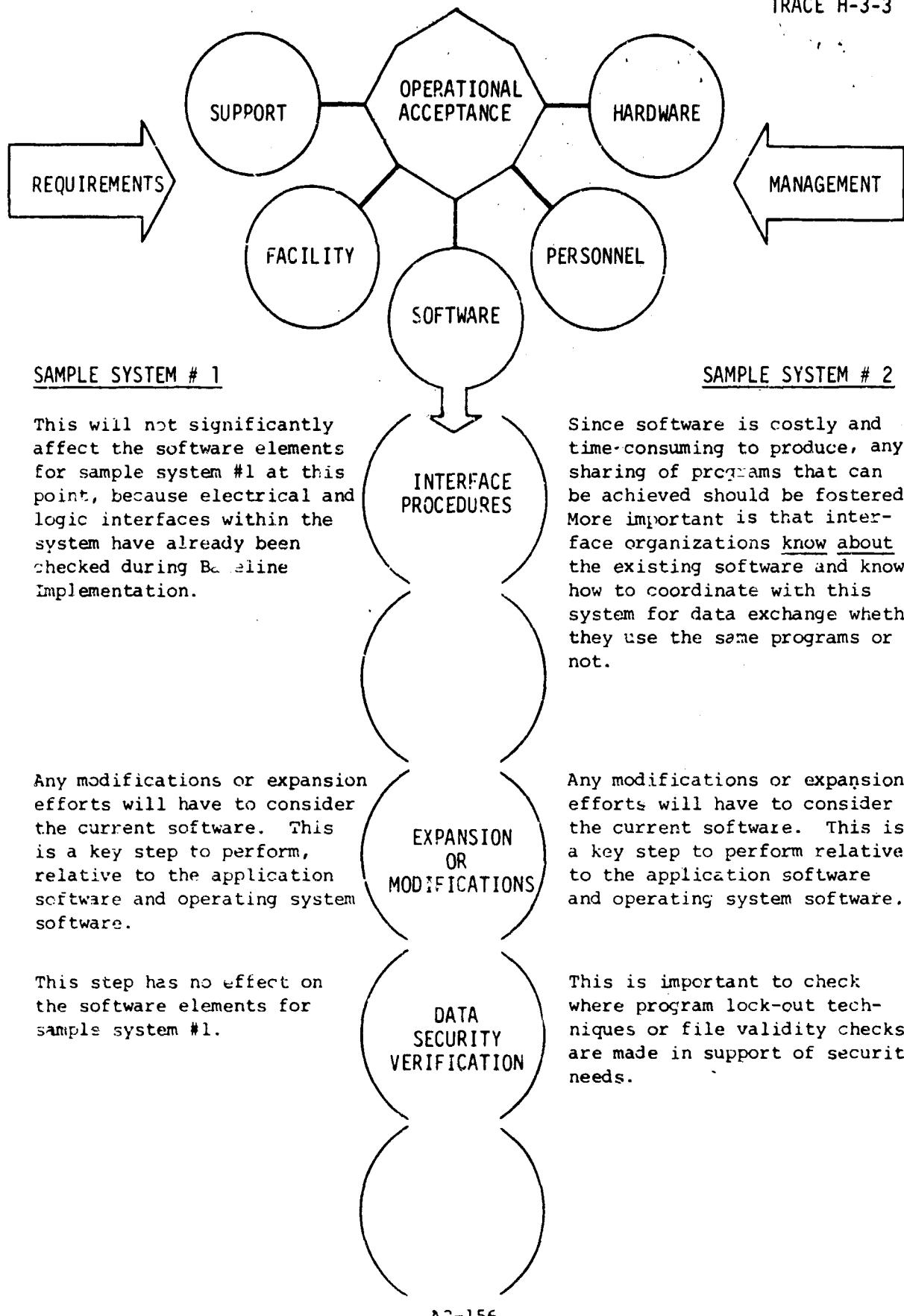
This should result after completion of the previous step. Since this system will have data processing support provided to many of the functional areas, the related software interfaces to the functional areas' operating procedures should be documented.

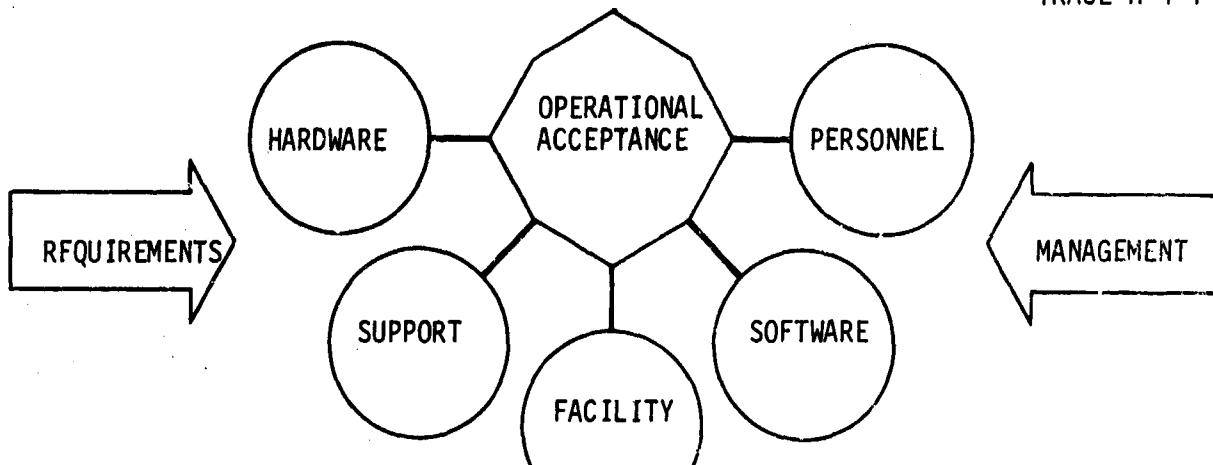
This step should coordinate the software documentation to assure that references and software-related training aspects are correct and well-described.

This step should coordinate the software documentation to assure that references and software-related training aspects are correct and well-described.

This step will validate the application programs as being correct and efficient for the man-machine operations to be performed at the CRT display console.

The sub-sets of the software must be demonstrated against previously generated and approved test plans. Management and user participation in key functional areas is important to make known the software advantages in this system, future software needed, or software relationships to other projects and systems.



SAMPLE SYSTEM # 1

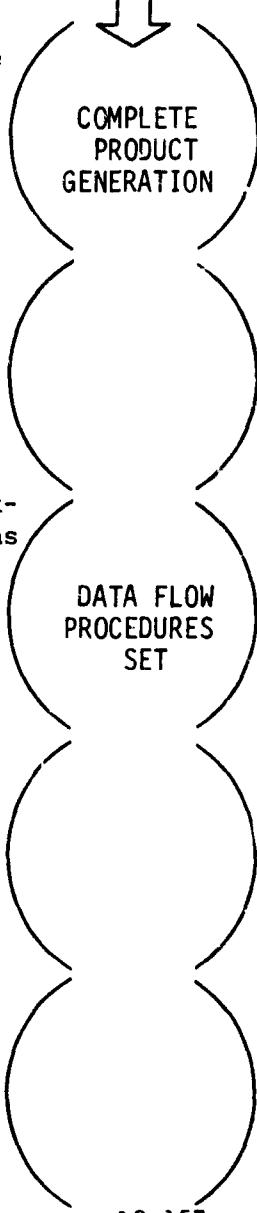
This step will not affect the facility elements for sample system #1.

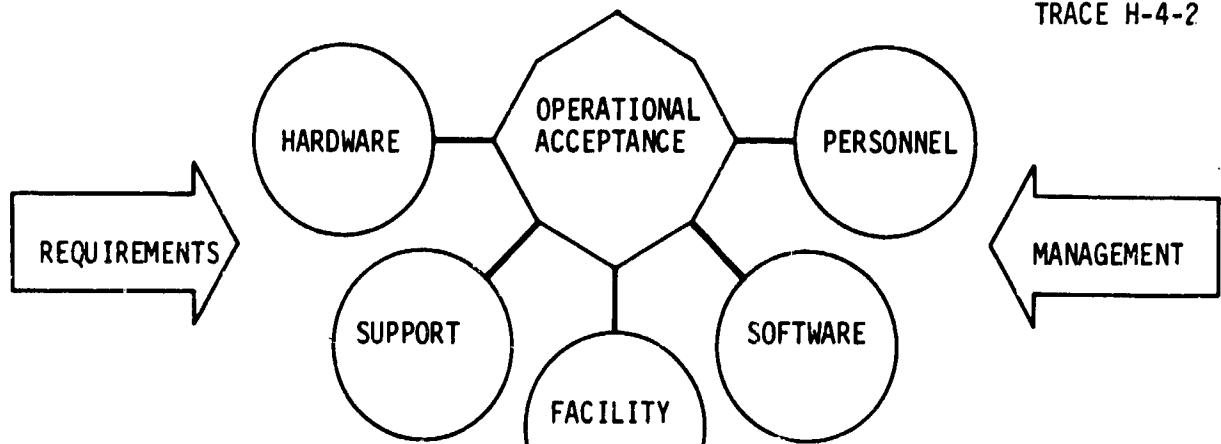
SAMPLE SYSTEM # 2

Certain products require special supply storage, large space for handling or shipping, and many people to help produce the item being generated. The facility elements could be taxed for the first time at this point, and this should be known prior to all facility preparation support being released.

This step will check the working area and any modifications as being adequate for sample system #1.

This step should finalize the internal layout of the system's facility or connections between individual portions of the facility. This should be analyzed carefully prior to sign off on construction, because future facility changes and construction start-ups are very costly and cause very harmful affects on production operations.



SAMPLE SYSTEM # 1

This step will not affect the facility elements for sample system #1.

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SAMPLE SYSTEM # 2

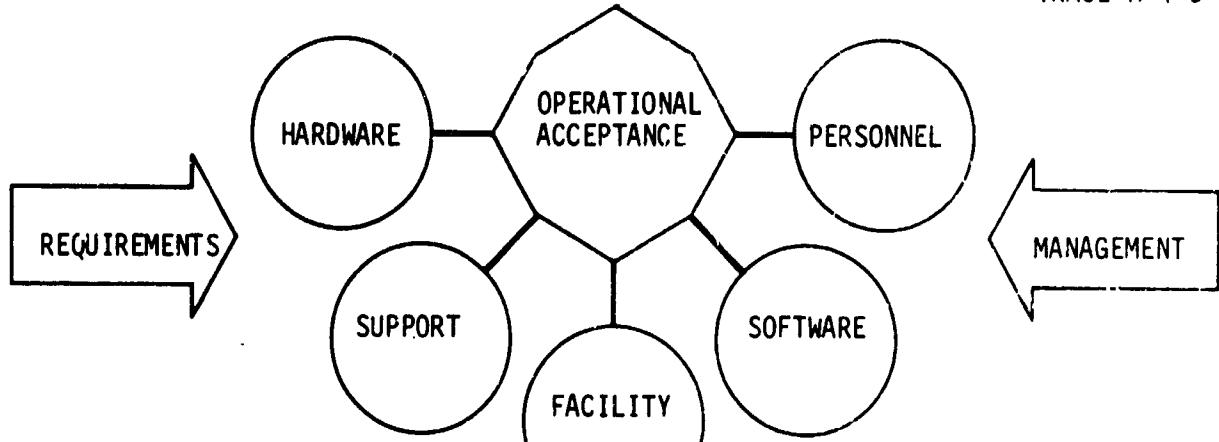
This step will not affect the facility elements differently than the previous step, except to clarify who is responsible for facility management, up-keep, and security control.

This step will result in the official records for guiding the care of the facility which houses the system.

This will affect the facility elements if a special facility, like a shelter is used for part or all of the facility for this system. Some training will require facility operation and maintenance data in this latter case.

This step will be a final check of facility acceptability and a point where most management or coordinating groups will have a chance to examine the facility. Bad facility elements will be quickly identified by demonstration observers before other parts of the system are operated; therefore, completeness is important at this point.



SAMPLE SYSTEM # 1

This step will not affect the facility elements for sample system #1.

This step will cause a re-evaluation of the work station area and should be documented for later use.

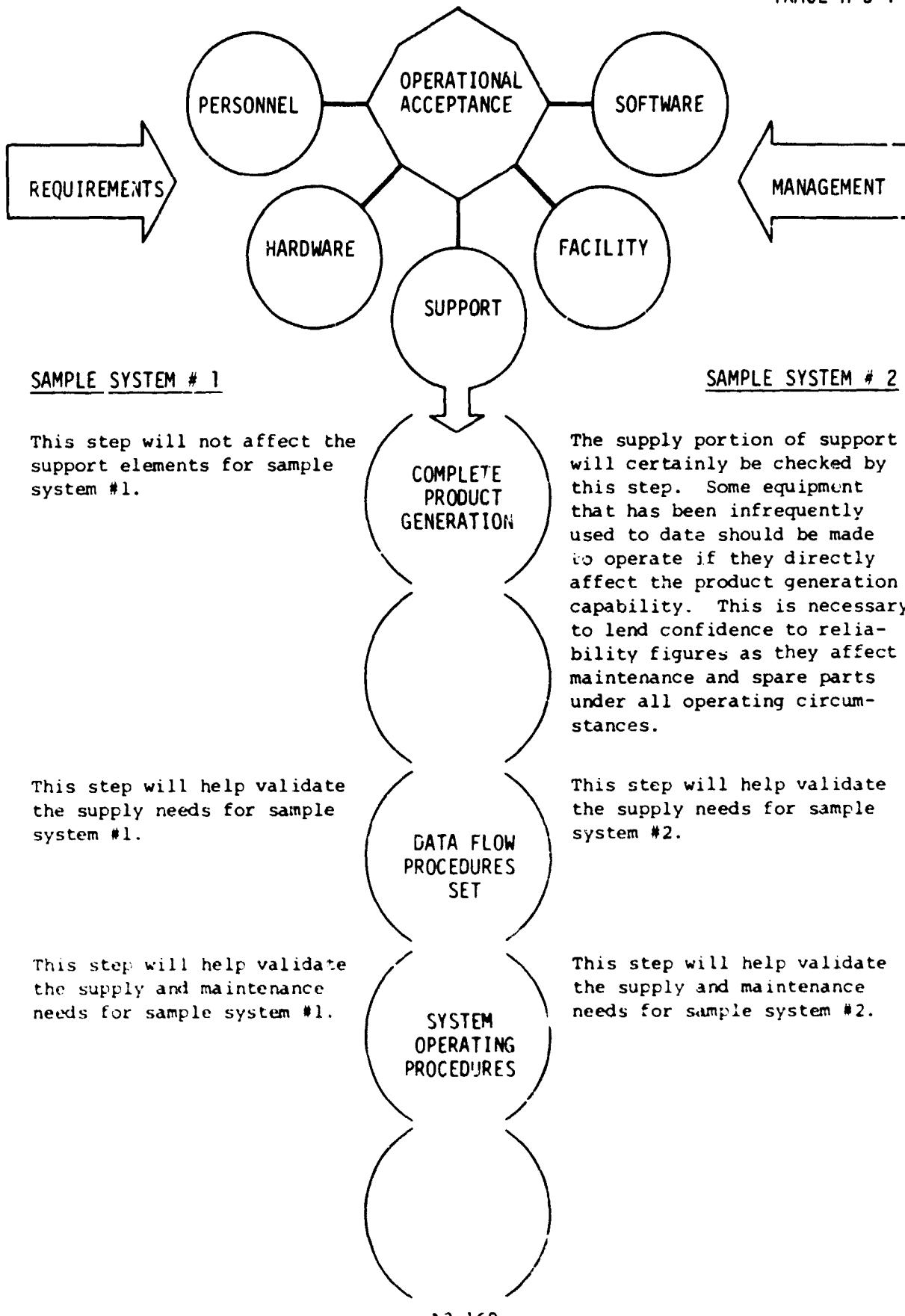
This step will not affect the facility elements of sample system #1.

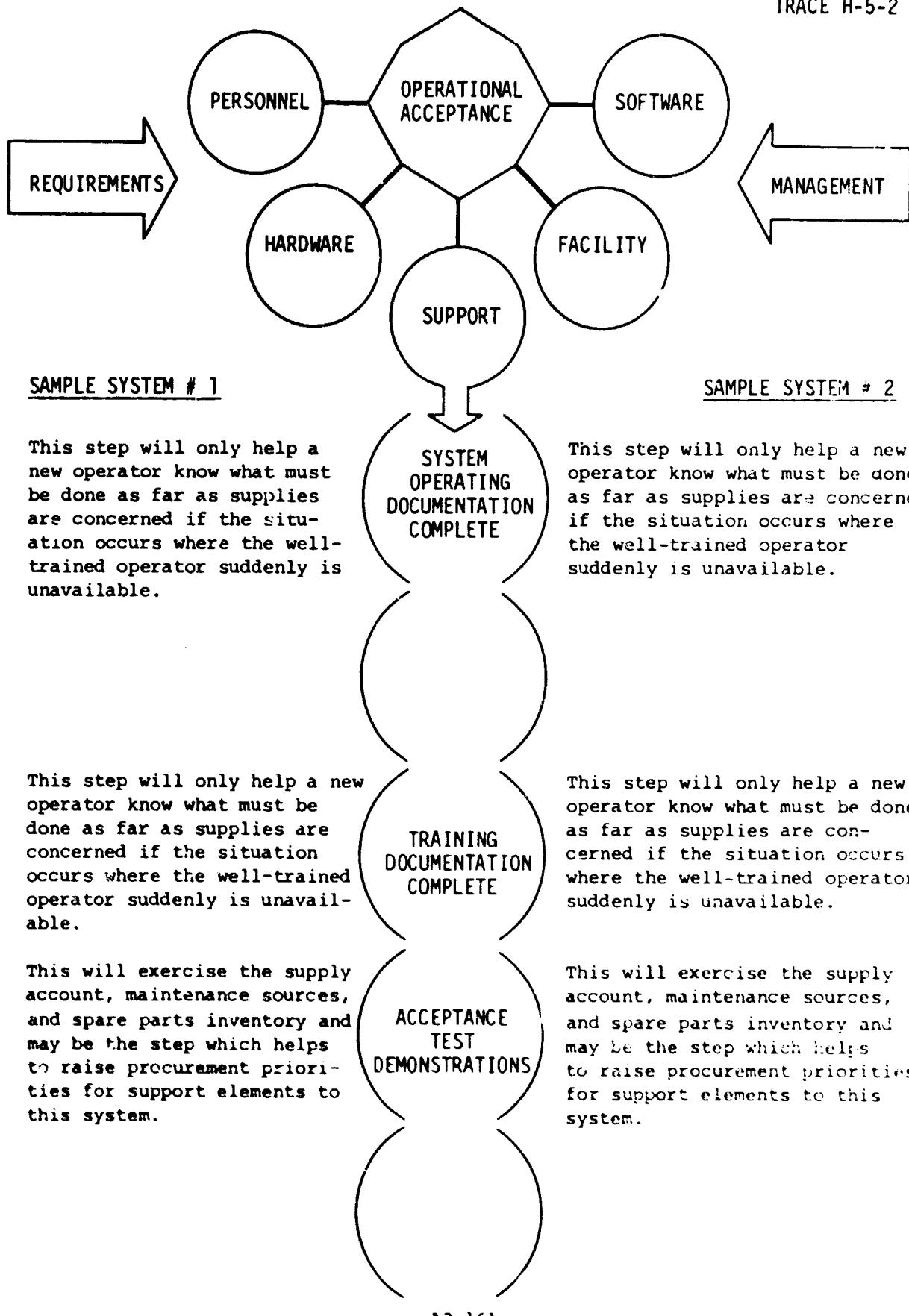
SAMPLE SYSTEM # 2

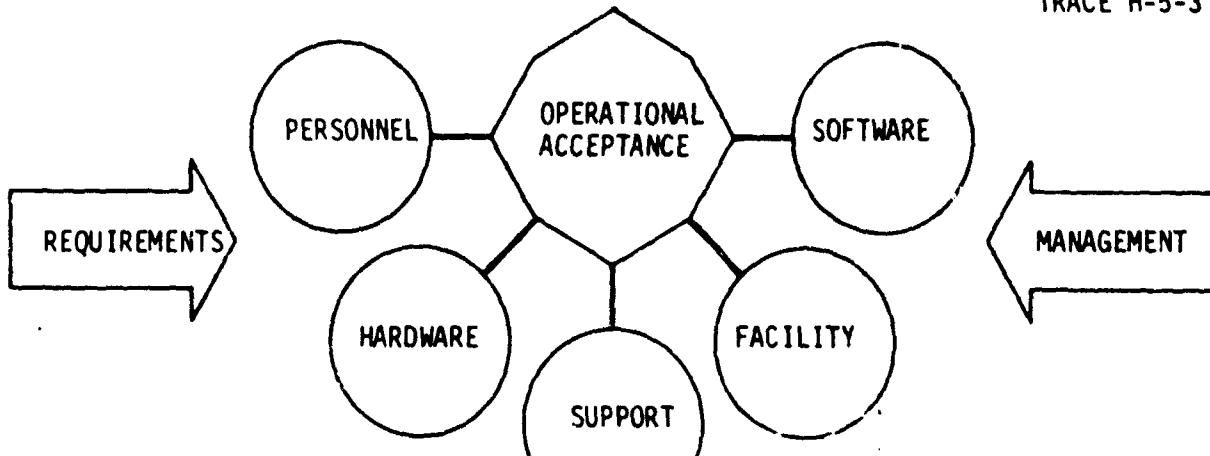
Since a great volume of multi-security level data will be going in and out of the facility, the shipment and receiving areas must be reviewed for acceptability. The location of briefing rooms, communication areas, etc., will be vital to the success of this system; therefore, the internal and external interfaces must be carefully checked during early stages of the Operational Acceptance Task.

Any such plans as these must take the facility into consideration. Waivers to facility specifications may be needed in view of an expansion program to be implemented in the near future.

Shielding, cabling, vaulted area safeguards, and physical guard stations should be checked carefully to assure that the facility is properly constructed and utilized to maintain the levels of security at the right places, at the right times, and most efficiently.





SAMPLE SYSTEM # 1

This step has minor significance to the support elements unless procurement or contractor interfaces need further coordination on their respective jobs in support of the system.

This step will be necessary if expansion or modifications are contemplated. The support stock may be held to a low level until the expansion is done, at which time more long-term operational supply accounts will be needed.

This is not applicable for sample system #1.

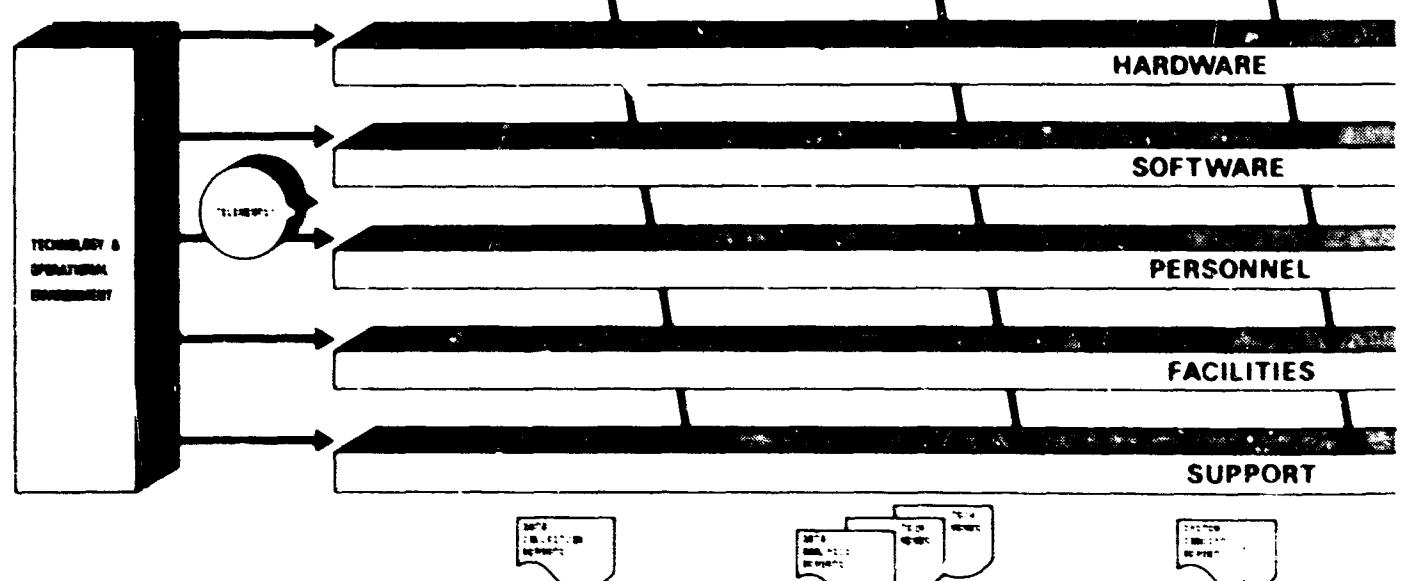
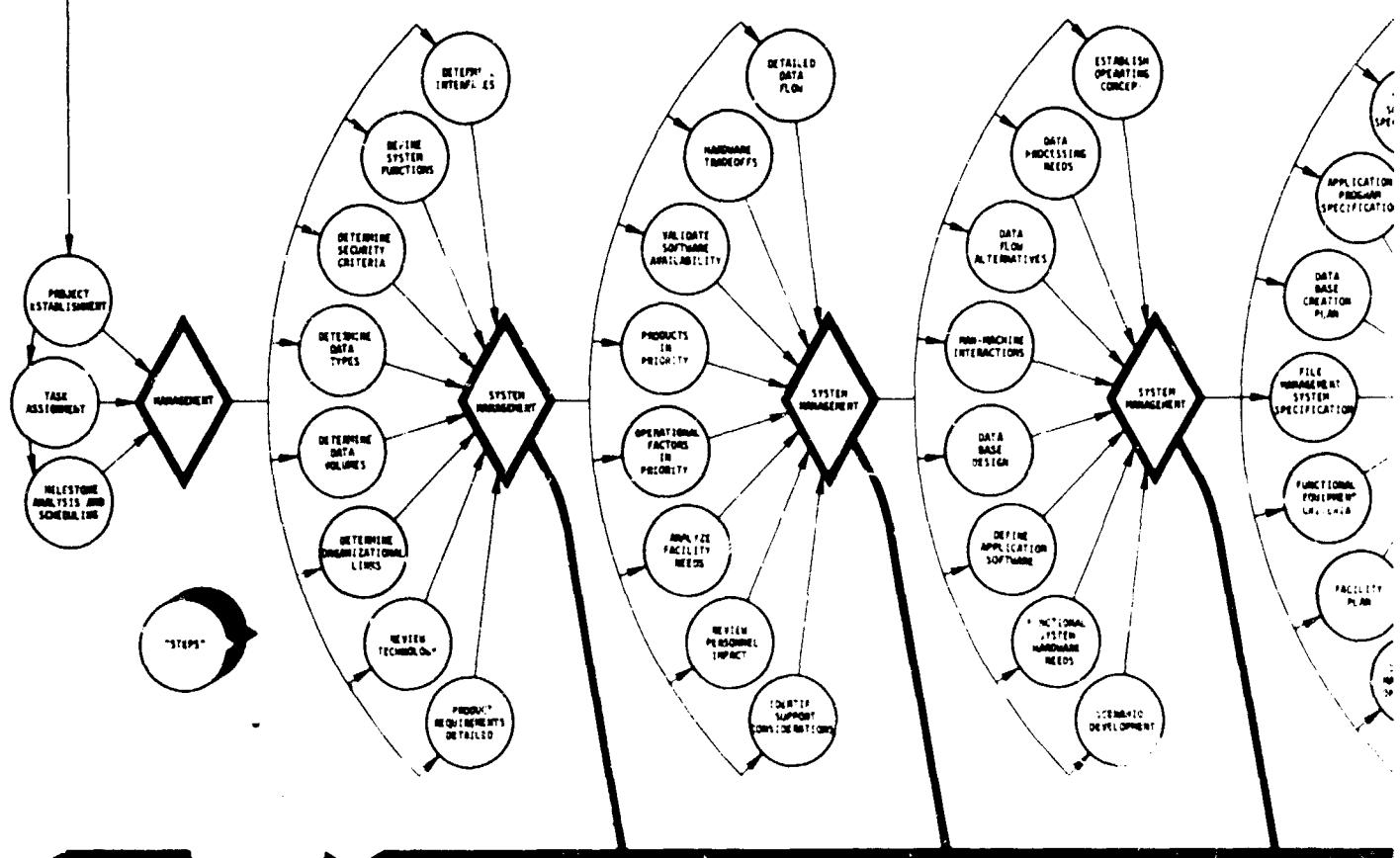
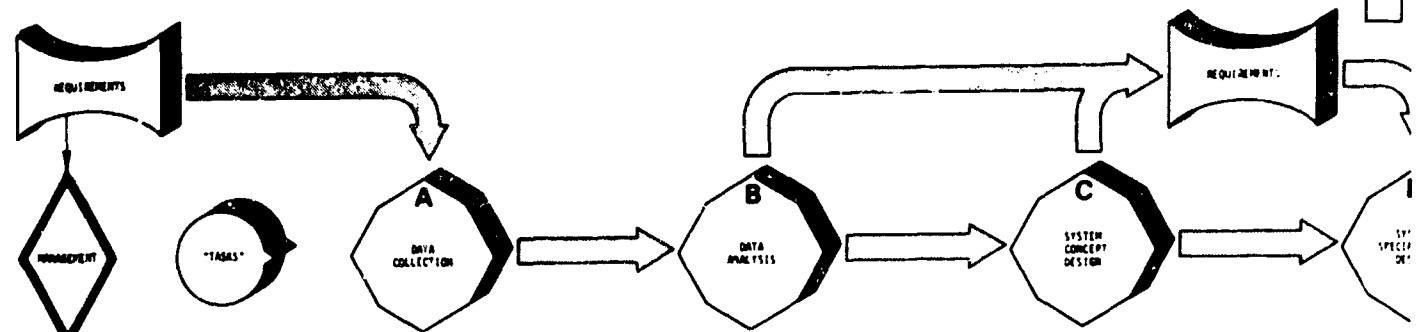
INTERFACE PROCEDURESEXPANSION OR MODIFICATIONSDATA SECURITY VERIFICATION

This is a step of major importance for a system like this. Many critical support elements are provided by outside organizations for a tactical system, and these interfaces should be clearly operational prior to system acceptance by the user.

This step is also important, because,

- 1) A large system usually is in the process of expansion or modification at this point, and
- 2) Any such action will affect supply, maintenance, and other support elements almost immediately.

This is an important final step to assure that support elements that provide security checks are adequate and will be continually satisfactory. Periodic inspections, maintenance to alarm systems, and shipping supplies used for the protection of "high level" classified materials are examples of these elements.



TRACE

B

total
requirements
analysis for
change and
control

baseline
and
control

segments

